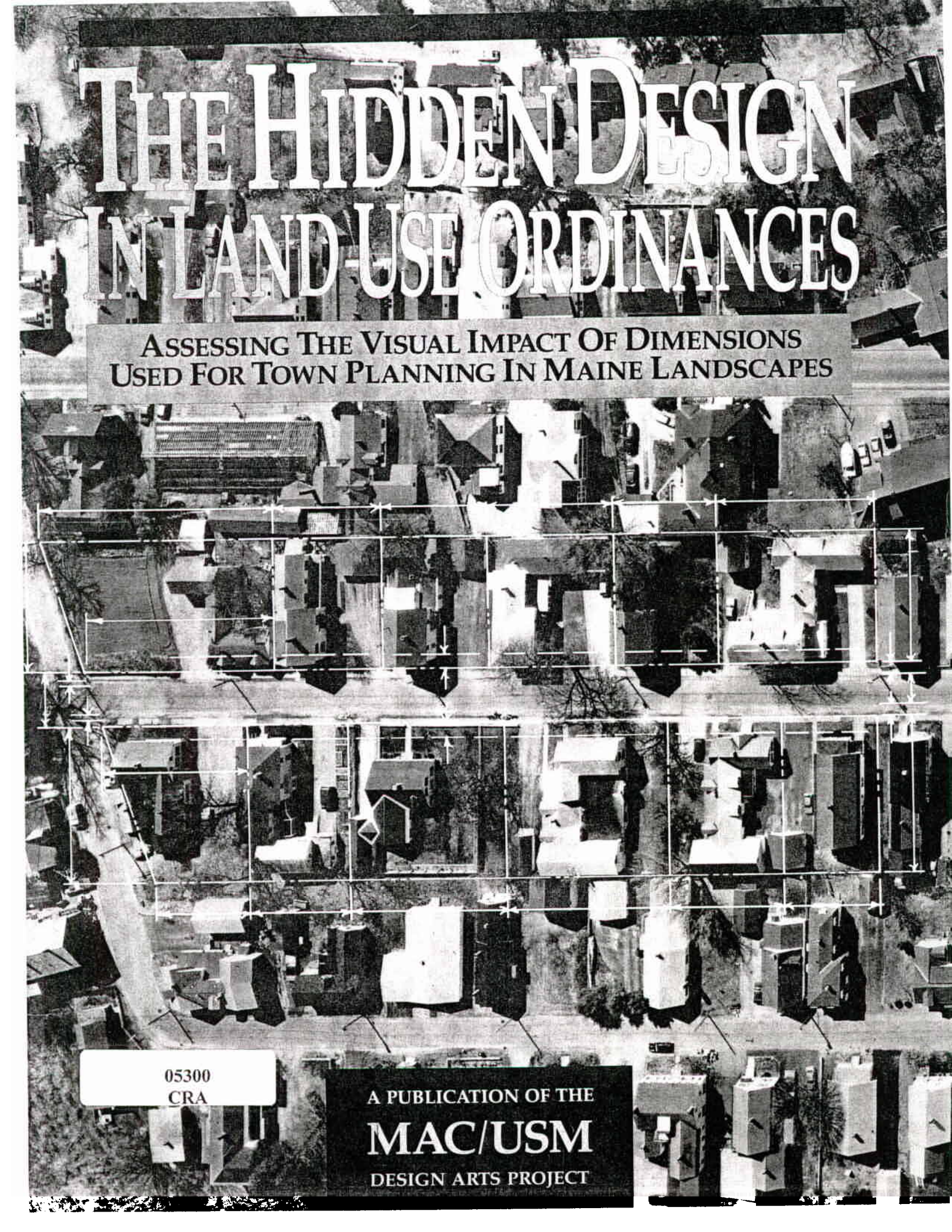

THE HIDDEN DESIGN IN LAND-USE ORDINANCES

ASSESSING THE VISUAL IMPACT OF DIMENSIONS USED FOR TOWN PLANNING IN MAINE LANDSCAPES

A PUBLICATION OF THE
MAC/USM
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Edited By
Paula M. Craighead
Project Director

March, 1991

ACKNOWLEDGMENTS

The success of this manual is due entirely to the energy, enthusiasm and support of many people. Any limitations and shortcomings of the project and manual are solely my responsibility.

Paula M. Craighead,
Project Director

March, 1991

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CONTENTS

INTRODUCTION

Introduction

Members of one Maine community decided at town meeting three or four years ago that they wanted to maintain the town's "rural character." According to a resident who attended the meeting, no one raised the question of exactly what that meant. That is, no one asked, "What *is* the rural character of our town?"

Nonetheless, the town developed a new zoning ordinance meant to preserve its rural character. What the town did was to create two zones: one, rural/agricultural/ forest; the other, commercial. In the rural zone, one-acre lots were allowed along the roadways, but lots without a certain amount of road frontage were required to be three acres in size. In the commercial zone, every lot had to be at least one acre in size.

The result of this effort to preserve town character was intense development along the roadways. All the main arteries are becoming lined with houses. The town resident who reported this unintended result believes that if the town had used a process to visualize the effects of its zoning action – and perhaps given more attention to its goals – its citizens could have seen from the outset that the zoning adopted would not maintain rural character. The town's actions appear to have worsened the problem of strip development along its roads.

The town's experience is not unique and provides a lesson for all of us – there are fundamental design implications present in all land use ordinances. These "hidden" elements of design can be seen and taken into account if our land use ordinances are to help guide development in ways that complement our towns and cities.

The Purpose Of This Manual

This manual has been developed to help people visualize the hidden design that is present in their land use ordinances. It is being distributed as a companion manual to *How to Prepare a Land Use Ordinance* (May, 1990), published by the state Office of Comprehensive Planning.

By becoming familiar with the tools and ideas presented in this manual, community members and decision makers can become more comfortable with the visual reality of zoning. They will be able to better understand how their land use laws will affect the "look" of the town as it grows and develops.

How The Manual Is Organized

The chapters in this manual discuss some tools and ideas that can help you think visually about the process of regulating land use.

CHAPTER ONE – **Visualizing Space,** introduces some ideas on how you can visualize distance, area, and height.
CHAPTER TWO – **Design Tools,** presents 14 visual tools, such as maps, plans, and models, with which planning committee members should be familiar.
CHAPTER THREE – **Assessing the Visual Impact of Zoning Law Dimensions,** discusses the visual impact of such factors as street frontages, lot areas, setbacks, roads, and parking. It also discusses "growth" and "rural" areas, vegetation, and performance standards. Finally, it presents a case study of how one town encouraged its citizens to think about town design.
CHAPTER FOUR – **Envisioning the Future,** offers a summary of the reasons for using visual tools.

Several appendices accompany the manual. *Appendix A* gives instructions on how to build a model. *Appendix B* includes the agenda for the meeting discussed in *Chapter Four* at which townspeople in Wendell, Massachusetts considered the design of their town. *Appendix C* offers a bibliography for further reading on the subject of visualizing design elements.

How This Manual Was Produced

A random survey of architects and designers was conducted in 1989 to assess what kind of research is being conducted on New England town design issues. Several designers responded to the survey. They were then sent a second survey asking them to show how they would illustrate and help a community visualize the dimension standards in Maine's land use manual. The dimension section of the land use manual was chosen because it is a fundamental tool to control density and therefore has significant design implications.

The responses chosen for this manual were selected to demonstrate a broad spectrum of visual tools used by designers. This manual explains how these visual tools can help town planners and policy makers understand the spatial relationships that will be created by regulating land use.

Sponsors

This publication is a product of a two-year pilot program sponsored by the New England Studies Program at the University of Southern Maine (USM) and the Maine Arts Commission (MAC).

The purpose of the MAC/USM Design Arts Project is to bring together design practitioners (architects and landscape architects), academics, and government policymakers to address Maine design issues. The goal is to create a database of researchers and practitioners working on this issue, to draft a manual addressing visual impact issues, and to convene periodic forums for all participants to discuss their ideas in an open environment.

The Maine Office of Comprehensive Planning in the Department of Economic and Community Development and the Department of Environmental Protection cooperated in the project. Funding has been provided by the National Endowment for the Arts Design Arts Program, the New England Foundation for the Arts, the Eva Gebhard-Gourgaud Foundation, and the Charles Shipman and Joan Whitney Payson Charitable Trust. Additional support has been provided by the University of Southern Maine's Office of Sponsored Research, the USM New England Studies Program, the Maine Arts Commission and the New England Writers Group.

We are grateful to all the people at these agencies for their encouragement and faith.

Contributors

Ideas and text for this manual were generously contributed by the following design professionals:

Randall Arendt is associate director of the Center for Rural Massachusetts. In *Design Guidelines for the Connecticut River Valley,* he and collaborator Harry Dodson revealed the power of visual information in town planning.

Nancy Barba is a principal in the Portland, Me. design firm of Reed and Barba Architects. She is active in Maine historic preservation issues and has a special interest in historic and new religious structures.

Michael Boucher is a landscape planner with Terrence J. DeWan and Associates in Yarmouth, Me. He has used AutoCad, the most widely used drawing software on personal computers, for the past five years.

Walter Cudnohufsky is director of the Conway School of Landscape Design in Conway, Ma., and practices town design and planning as Walter Cudnohufsky and Associates. He advocates the inclusion of visual issues in the town planning process.

Michael Everett teaches landscape architecture and architecture at the Rhode Island School of Design and consults as Everett Associates, Inc. He co-authored *Building at the Shore* (R.I.) and is at work on a book about rural New England settlement patterns.

Theo Holtwijk is a practicing architect with Stevens, Morton, Rose, and Thompson in Portland, Me. Trained in the Netherlands, he is familiar with the design challenges of creating "new towns" in designated growth areas.

Robert Kahn is a practicing architect with the firm of Douglas Richmond Architects in Brunswick, Me. He is experienced in facilitating group process on design problems, balancing consensus with individual participation.

Philip N. Loheed, AIA, is a partner in Loheed Design Partnership, of Watertown, Ma. A former partner with Benjamin Thompson, his work includes environmentally sensitive and human-scaled architecture worldwide.

Steven Moore is a principal in the firm of Moore/Weinrich Architects of Brunswick, Me. He is a voice for the architecture community as a member of the Maine Arts Commission. He has written about design for journals and newspapers.

Jerri Skinner and Sue Lambe are the principals in the landscape architecture firm of Skinner & Lambe of Portland, Me. They are experienced in using illustration and graphic representations to visualize governmental land use concepts and regulations.

Steven Theodore is a principal in his own design firm located in Richmond, Me. and teaches architectural design at the University of Maine-Augusta. He conducts research on regional building types and has designed according to these patterns.

What Is Meant by "Hidden Design" and Other Terms?

Design occurs whenever policies or land use regulations, that is, governmental action that determines the type and limitations of uses and structures that will be sited upon the land in a community, affect space in a town.

When governmental action is implemented without an understanding of the potential design implications, the result is hidden design. Why "design" at all? Doesn't that mean an intended result created by an architect or other design professional? Professionals *are* trained to deal with space and materials in a functional and sensorial way. However, even when there is no intentional effort to control space and materials, something will fill the void. Space in a community is going to change if the natural and built elements that define space – roads, trees, walls, and structures – change in any way.

The term "town" is used interchangeably with "community" in this manual. In common usage, the term "town" may mean only densely built or developed areas; here it means the political unit of local government. In other states, the political unit of local government for rural areas is often county government. In Maine, within any town are developed and undeveloped areas, often more than one village, and there are no land areas that are not within a town boundary and, therefore, town governance.

Finally, the terms "zoning" and "land use regulations" where used in this manual are interchangeable. There has been some experience by planners in Maine that in order to make planning

acceptable in rural areas, the term "zoning" must be replaced by "land use regulation" in local ordinances. Because zoning is an urban planning tool and has evolved legally in this country almost exclusively according to urban needs, the logic to this terminology choice bears examination beyond the scope of this manual. For the legal and planning professions, however, they are still the same thing. The term "land use regulation" is used most often in this manual as the term of choice for everywhere in Maine that is not Bangor, Lewiston-Auburn or Portland.

Any other unfamiliar terms we regret but believe, with the above exceptions, that standard usage applies.

Traditional Land Use and Zoning

The practice of zoning in a comprehensive way is relatively new in our country. It was first used on a city-wide basis in New York City in 1916. It later became used extensively and adapted for expanding cities in the Midwest. Its nature is little changed since its creation: control form (height, bulk and mass) and separate uses (commercial from residential from industrial).

In New England, land use patterns predate the establishment of zoning by more than 200 years. While zoning has found the broadest use in urban settings, it is now proposed to be applied to Maine, a primarily rural state. It is believed to be the best strategy available to prepare for rapid and uncontrolled growth, the impetus for passage of Maine's Growth Management Law in 1988.

Zoning For Contemporary Needs

For zoning to be compatible with New England rural village character, attention should be paid to existing, desirable patterns of development. By assessing the visual character of your town, you may be able to create land use regulations that avoid some of the problems associated with traditional zoning, such as strip development along roadways. Strip developments tend to result due to a modern marriage of traffic design standards and separating commercial uses from other living patterns.

Traffic design standards should be studied and understood as much as possible by local planning boards and their staffs so they can easily recognize them in proposed land use regulations. The reason for this is that the void created by a lack of integrated town design in land use regulations has been filled in recent years almost exclusively by traffic planners and engineers. Their standards are typically woven seamlessly and consistently throughout a body of local ordinances whether or not a town may want them. Having standard drainage dimensions, pavement specifications, curb cuts to name only a few elements, begins to have a homogenizing, cumulative effect on local, possibly special, landscapes. In the absence of other priorities, especially human-scaled features, a town risks adopting land use regulations that are oriented solely for vehicular convenience unless an examination of when and where this is not appropriate is conducted.

Today, town officials and planning committee members must wrestle with economic development, conservation, historic resources, affordable housing, waste disposal, and the simple fact of life that is traffic. Local land use regulations need not mean a scaled-back version of urban zoning rules: locally tailored ordinances can provide the opportunity to address those issues in a way that also enhances the design of the town.

Civic Design

This manual does not discuss building design, or architecture. It is concerned with the civic realm: the planning of roads, the determination of land use, the regulation of lot size and related space and bulk requirements. Throughout the OCP manual, several dimension charts are shown as samples of ways how to create standards for civic space. These charts are valuable for form only and do not help a community know what numbers are best for it. Using a variety of visual tools, most of which are explained in the manual, to experiment with the proportions and scale the numbers represent, is the second step. The first step, also illustrated in Figure 40, is to measure and record local dimensions that are considered pleasing.

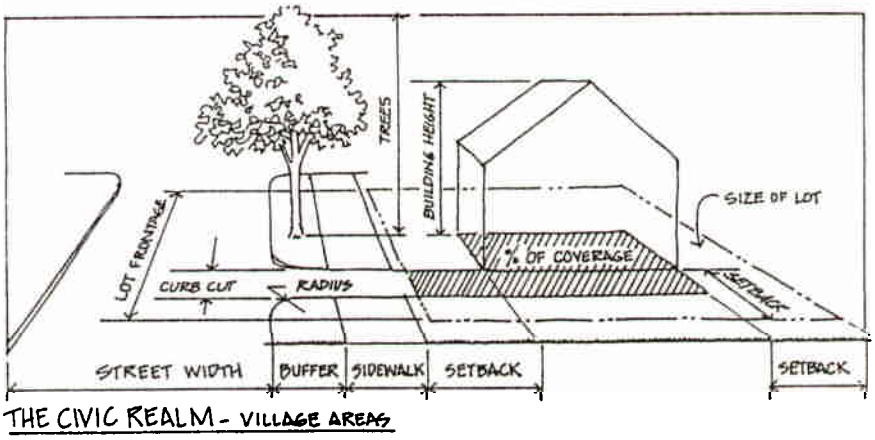


FIGURE 1

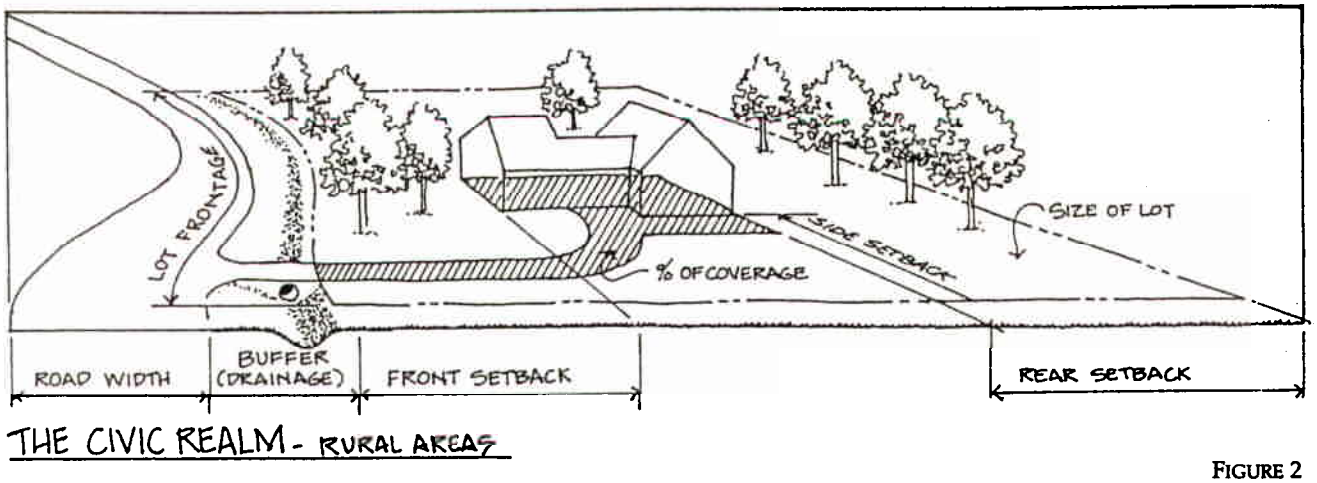


FIGURE 2

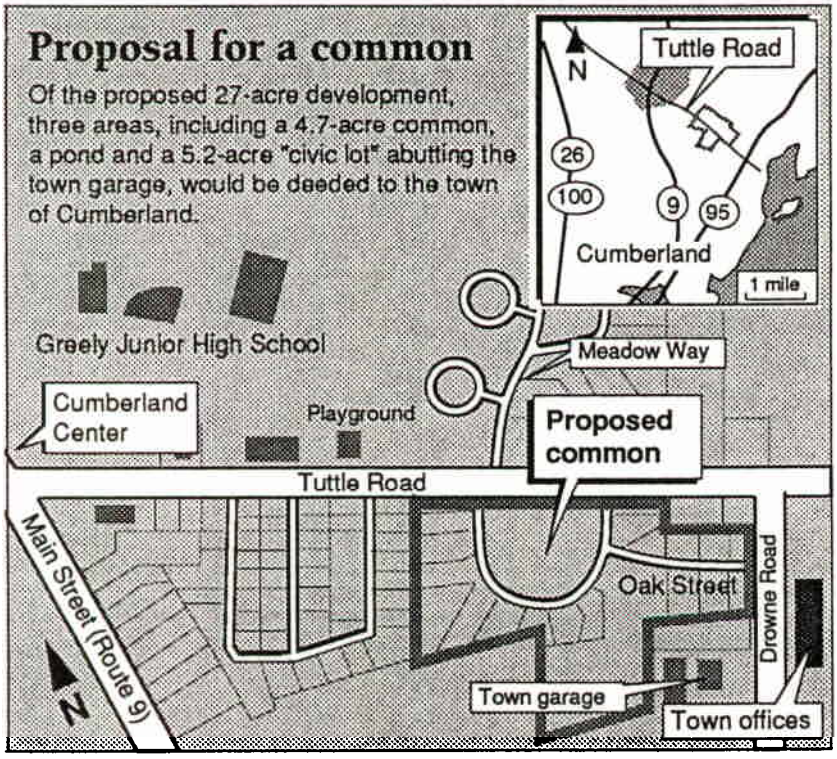


FIGURE 3

Point Of View

Finally, this manual does not present a single point of view. It recognizes that Maine towns are diverse and that each town's plans will vary from one another. In fact, throughout the manual you will find that the contributors may offer different solutions to the same design question. This leaves the selection and determination of a point of view for your town up to you. The tools presented in this manual will help you establish a point of view.

Civic design means a community considers how its dimension requirements and other land use policies affect the function and appearance of the town as a whole. These visual representations in Figure 3 and 4 show how a developer and his designer, Theo Holtwijk, propose the inclusion of a town common as part of a residential project. Towns can also take initiative to legislate civic spaces as part of a design program when opportunities arise. They can use visual tools like these during any land use legislative process.

FIGURE 4 *This development proposal shows houses around an open area. At the bottom is Tuttle Road. The town office building is in the background, at left.*

VISUALIZING SPACE

Introduction

Designing for the future growth of Maine towns is not simply a matter of numbers. There is no one magic figure for lot sizes, no setback dimension that is automatically going to produce the idyllic small town street scene. It is possible, however, to create pleasing space with some basic ideas about proportion and scale: how numbers for height and distance work together.

Designing is a visual process; regulating has been primarily a verbal and numerical process. The aim is to make sure the visual aspect of design is well represented in your regulations.

A basic issue in producing land use rules is how to visualize space. What are familiar references for comparison? What is the relationship between various elements at a building site and how can they be illustrated?

The following illustrations present basic exercises in becoming comfortable with spatial relationships.

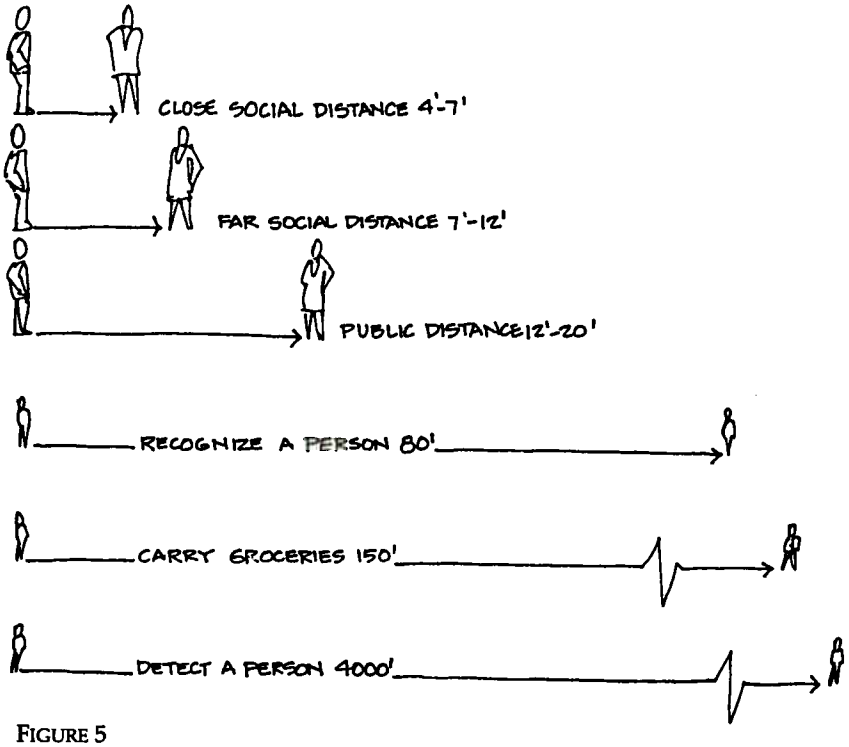


FIGURE 5

Distance and Area

The illustration in Figure 5 shows a way to think about distances between objects in conjunction with a number.

A good way to visualize distance is to use familiar objects as a reference. The dimension chart in *How to Prepare a Land Use Ordinance* shows a typical format for presenting dimensions specified in a zoning ordinance. It offers some familiar numbers to orient yourself. For instance, four medium car widths represent the minimum setback in a growth area (25'), four medium car lengths can approximate minimum street frontage (50'), and so on. But how can you visualize minimum lot areas? Visual comparison to a familiar space, a football field, is one way.

In Figure 6, comparison of one-acre lot size is roughly comparable to a football field. Within that space is shown the common 10,000 s.f. lot.

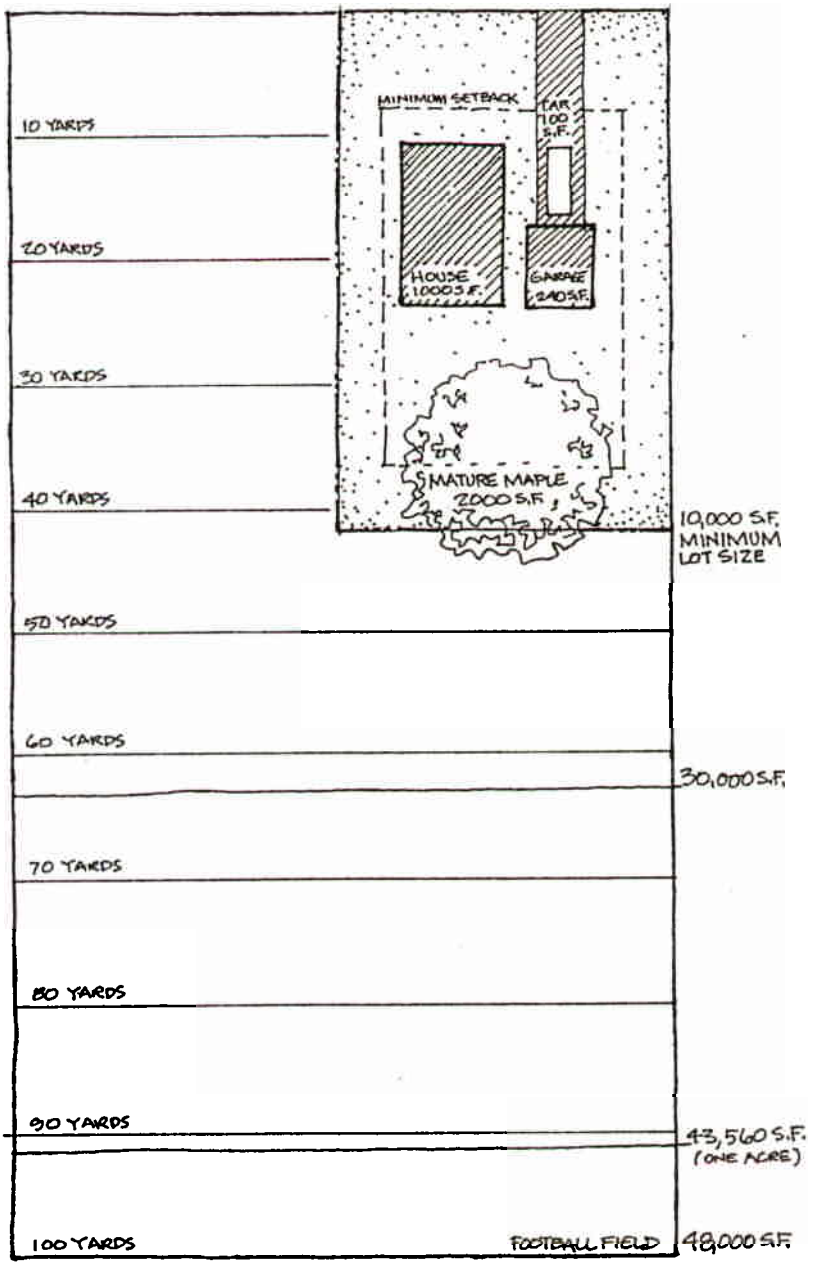


FIGURE 6

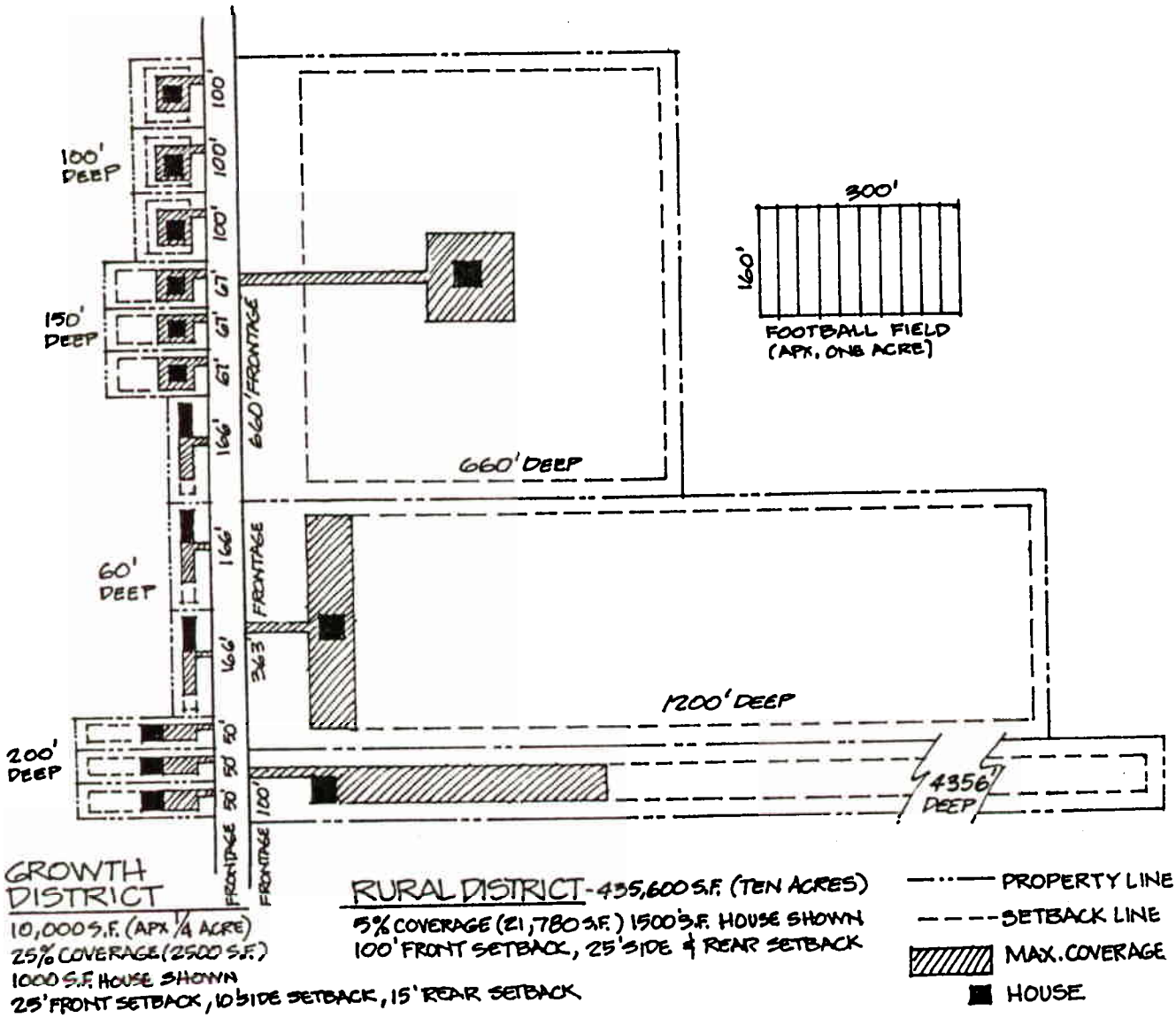


FIGURE 7

In Figure 7, ten-acre lots are shown not only in the various shapes they can take depending on frontage dimensions, but also the theoretical density capacity of that space. Note the comparative size now of the football field to quarter-acre and ten-acre lots.

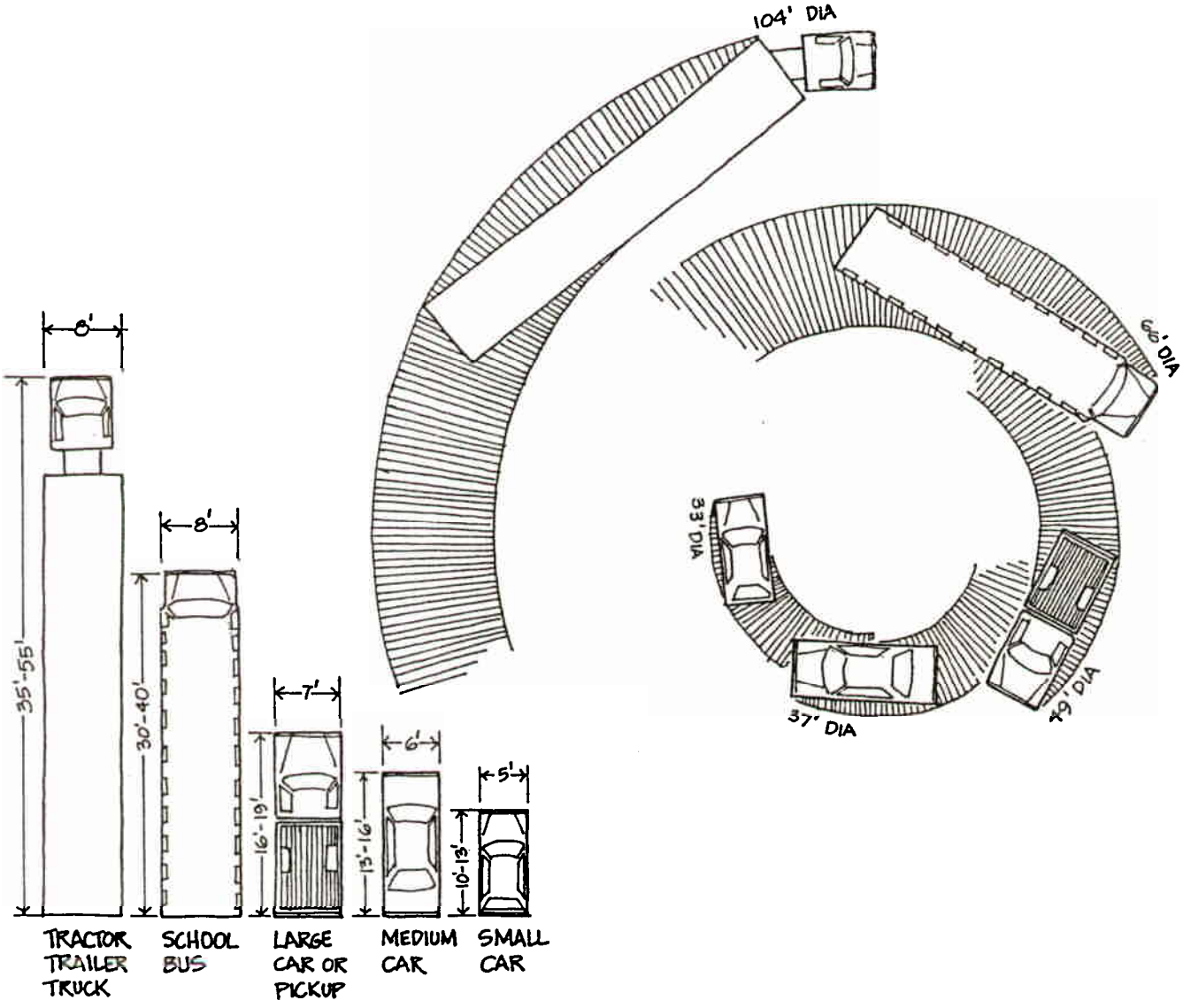


FIGURE 8

Much of modern life revolves around transportation. This diagram not only gives dimensions of typical cars and trucks that can help you visualize distances by using them for references, but also shows how the size of the vehicle planned around ultimately dictates road widths and radii, which are elements to create pleasing proportions and scale.

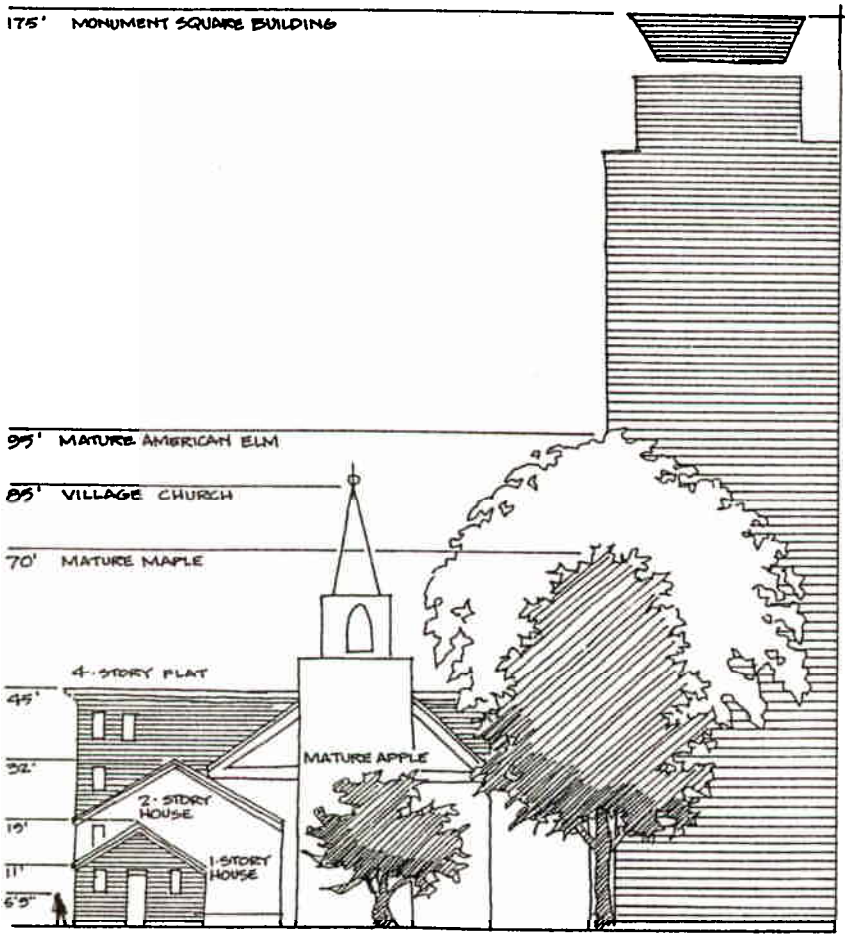


FIGURE 9

Height

Height is also best understood in relationship to the heights of various familiar but especially local objects. Recognizing the height of familiar objects (such as people and trees), as well as the specific height of local points of reference (church steeples, the town hall, or commercial structures) can help guide you in establishing height guidelines. Height is critical to the scale of a village or town. Urban scale is different from rural and village scale.

Michael Everett offers an alternative to suggestions that 50 feet is an appropriate maximum building height in Maine's growth areas. He suggests instead allowing 35 feet to the eave line and a total height at the ridge (if the slope requires it) of not more than 45 feet. Whether or not you agree with the height recommendations, you may want to consider being specific about the point to which you measure a building's height.

Where a person perceives the height of a building is a factor in determining where the height is measured. At greater setback, the ridge line is viewed, but at a closer range, only the eave defines height. The measuring point chosen may also generate a response by the marketplace to create varying roof pitch. The height to width ratio along a street creates the quality of space experienced by pedestrian and motorist alike.

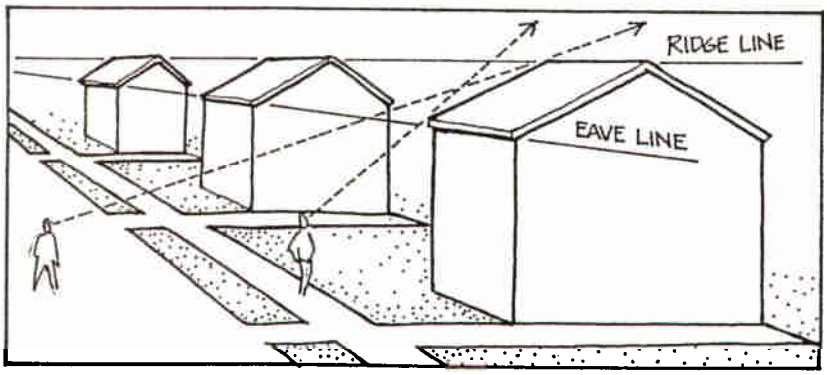


FIGURE 10

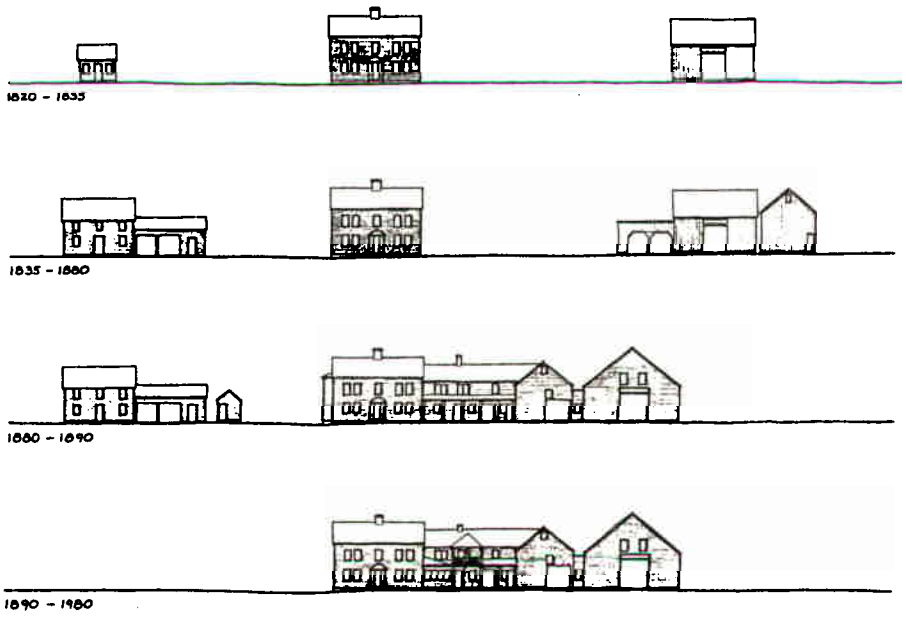
DESIGN TOOLS

Introduction

Town officials, planning board members and their staff are often presented with a broad array of written and visual material when a developer's designer submits a plan for approval. For many, the text can seem more straightforward than the visual presentation.

This chapter discusses the usefulness and limitations of some commonly utilized visual tools. By becoming familiar with these tools and how they are used, you will gain a clearer sense of what a designer is presenting. You will also become more comfortable with visualizing space and design. As a result, you will have a better understanding of how your land use ordinances influence the design of your town.

FIGURE 11 *Nevers-Bennett Farm, building development, 1820–1980, elevations.*



Visual Tools

An **elevation** is a two-dimensional representation of a building facade (its surface). It is primarily used to produce a positive emotional response in the viewer. It can be informative about height when drawn in context to other existing structures and mature trees. It is an impossible view in a real setting because the human eye perceives depths as well. An elevation is a fairly common tool that developers use when making a proposal to a town planning committee.

A **section** or cross section is similar to an elevation, but it is, as the term implies, a view of inside something. Sometimes the section reveals an interior space. In this illustration, it reveals something about slope and scale in conjunction with the plan of a site.

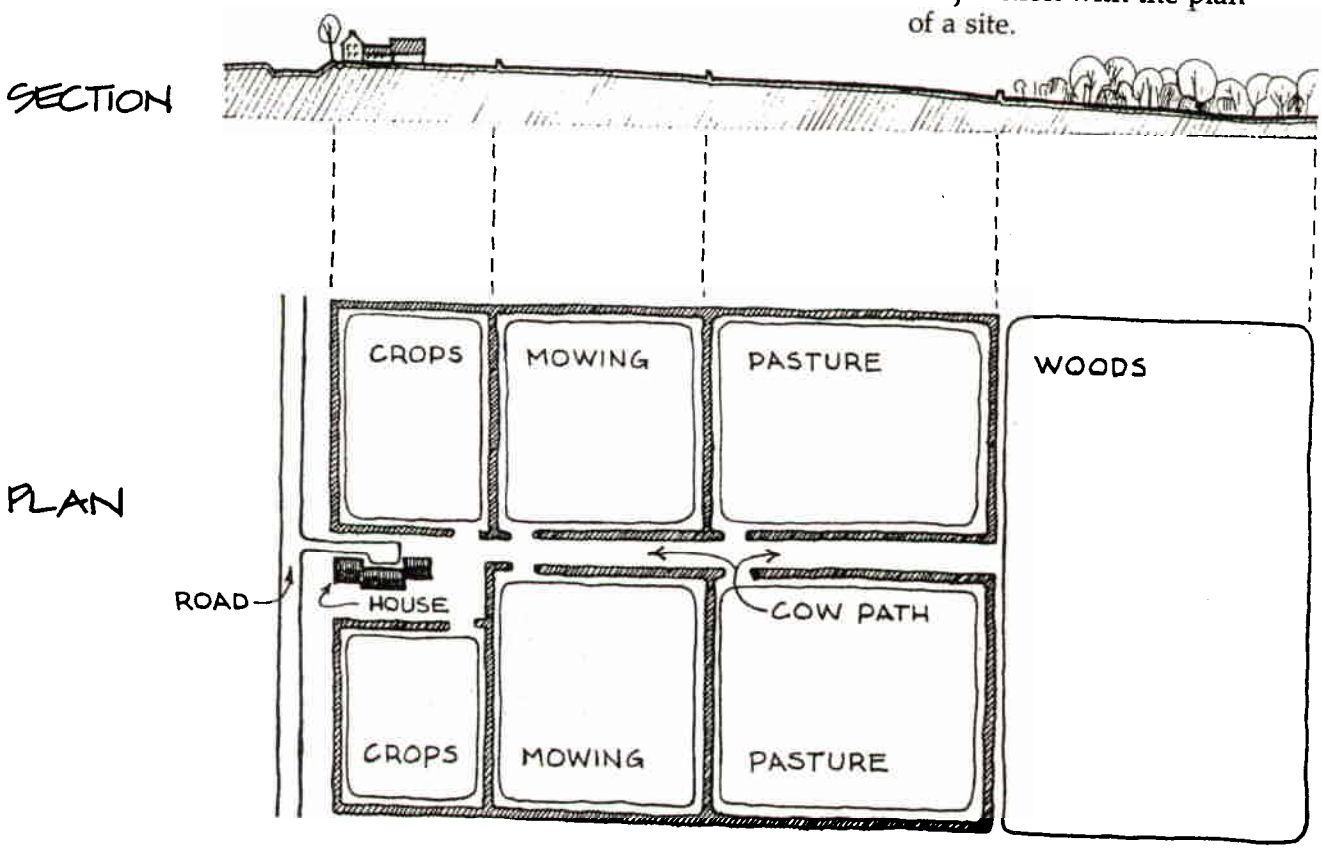


FIGURE 12

A **plan** presents the details of a project from a bird's-eye view, looking at a flat world. Plans can be used to show a subdivision development (a site plan), or the layout of a single structure. Plans are often used as an aid in negotiating the permitted density of a project or development. Plans are among the most commonly used design tools. It is difficult to understand plans on a human scale because we never experience space this way except in airplanes.

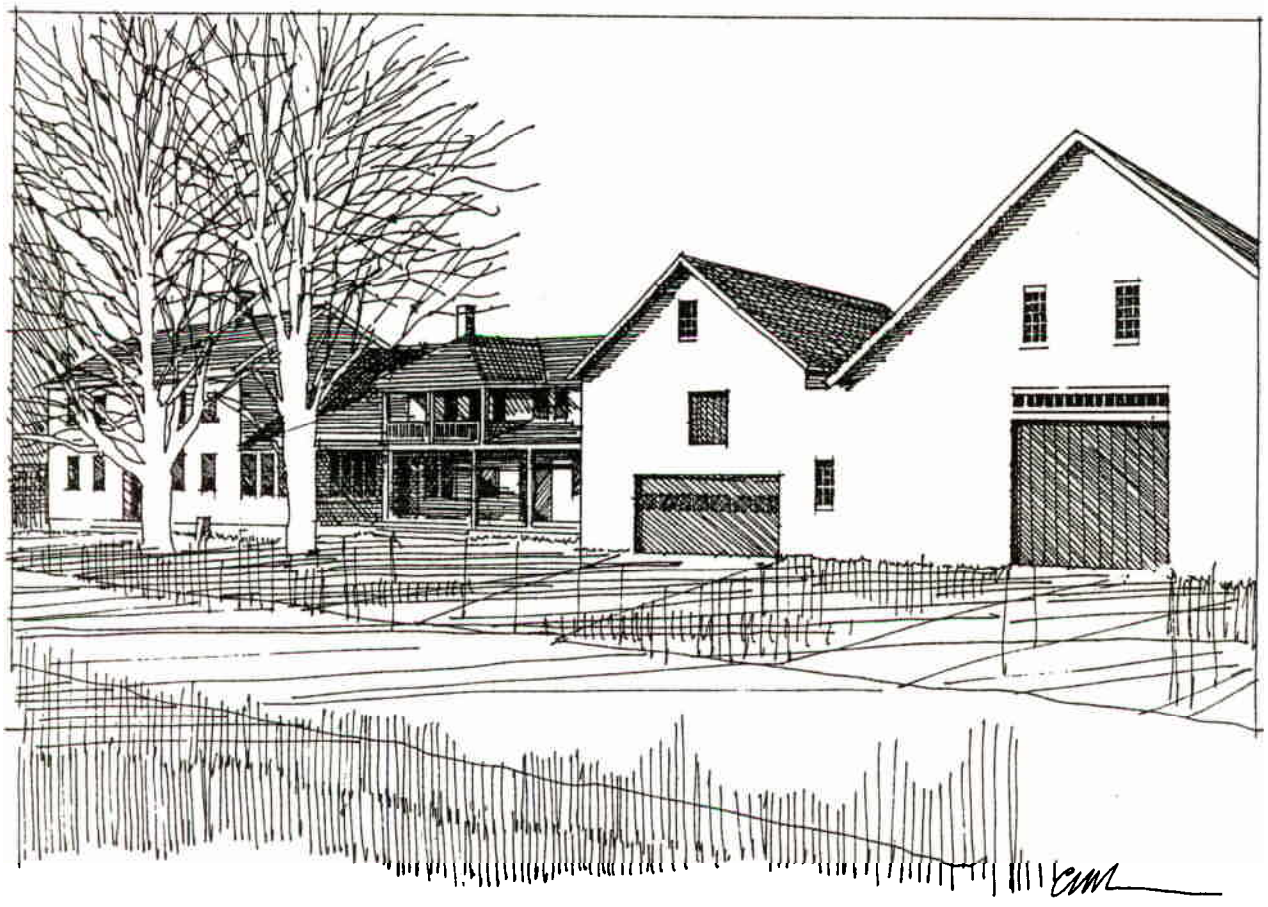
Maps are used to orient and inform about distances. Maps are among the most commonly used visual tools. They can also be used to show the location of resources, such as aquifers, wetlands, animal habitats, etc. They can be used as the start for town design but not in lieu of two- and three-dimensional visual tools.

FIGURE 13

A **perspective** presents the intersection of two facades from a fixed point, commonly at pedestrian level. Like an elevation, it is primarily used to produce a positive emotional response in the viewer. Perspectives are among the less informative design tools, but are frequently used in presentations. It is less informative because it shows only one view from a fixed point. It is more comforting to look at than a plan because it is as familiar as the views we see in a painting or photograph.

Photographs are primarily used to orient a viewer to the physical layout of a site as well as reveal depth through light and shadow.

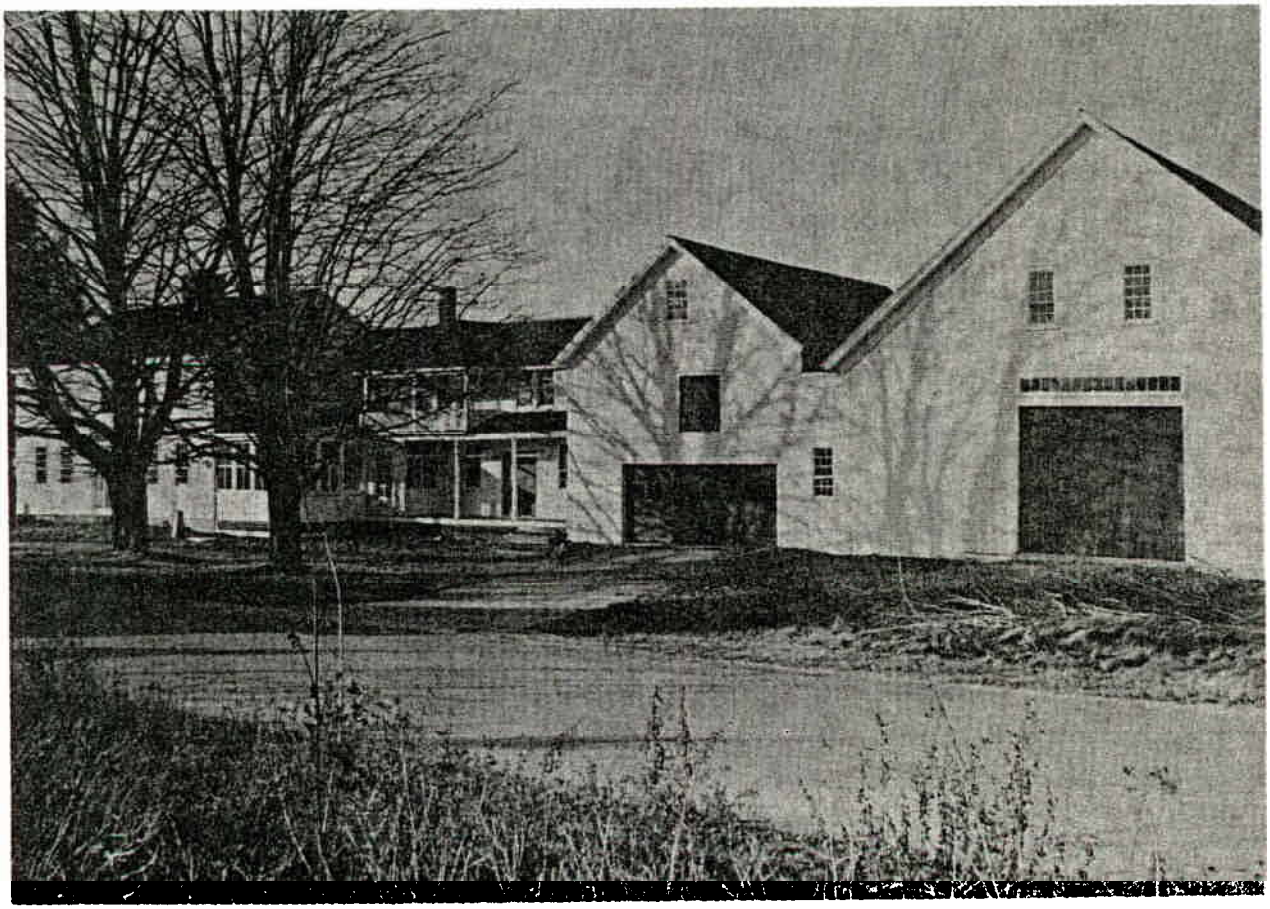
FIGURE 14 *Nevers-Bennett Farm, Sweden, Maine*



Through the recent development of photo imaging, a photograph can be changed to present a different image. For instance, a developer could take a photograph of a site and alter the photo to show how her proposed building would fit into the landscape.

Since the development and broad distribution of photo-altering computer software, photos can now be easily manipulated to show realistic alternatives for a site or streetscape. A photo, manipulated in this way, should always be labelled as an edited photograph.

FIGURE 15 *Nevers-Bennett Farm, Sweden, Maine*



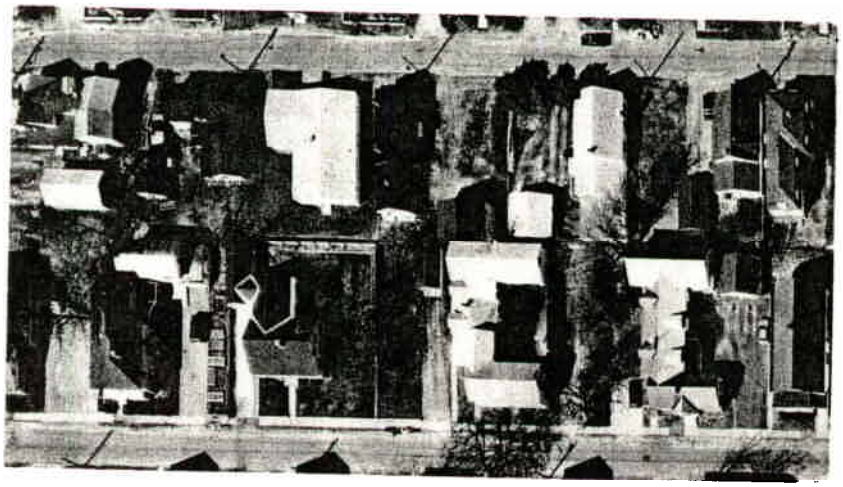


FIGURE 16a

Aerial photography can show how a plan, diagram and map relate to a site, if reference points, such as landmarks and lot lines, are shown and measured preferably in similar scale (overhead view shown left). An aerial photograph can also present such information as surface drainage, wildlife patterns, arable land, sun orientation, wind protection, and high vs. low ground (oblique view shown below).

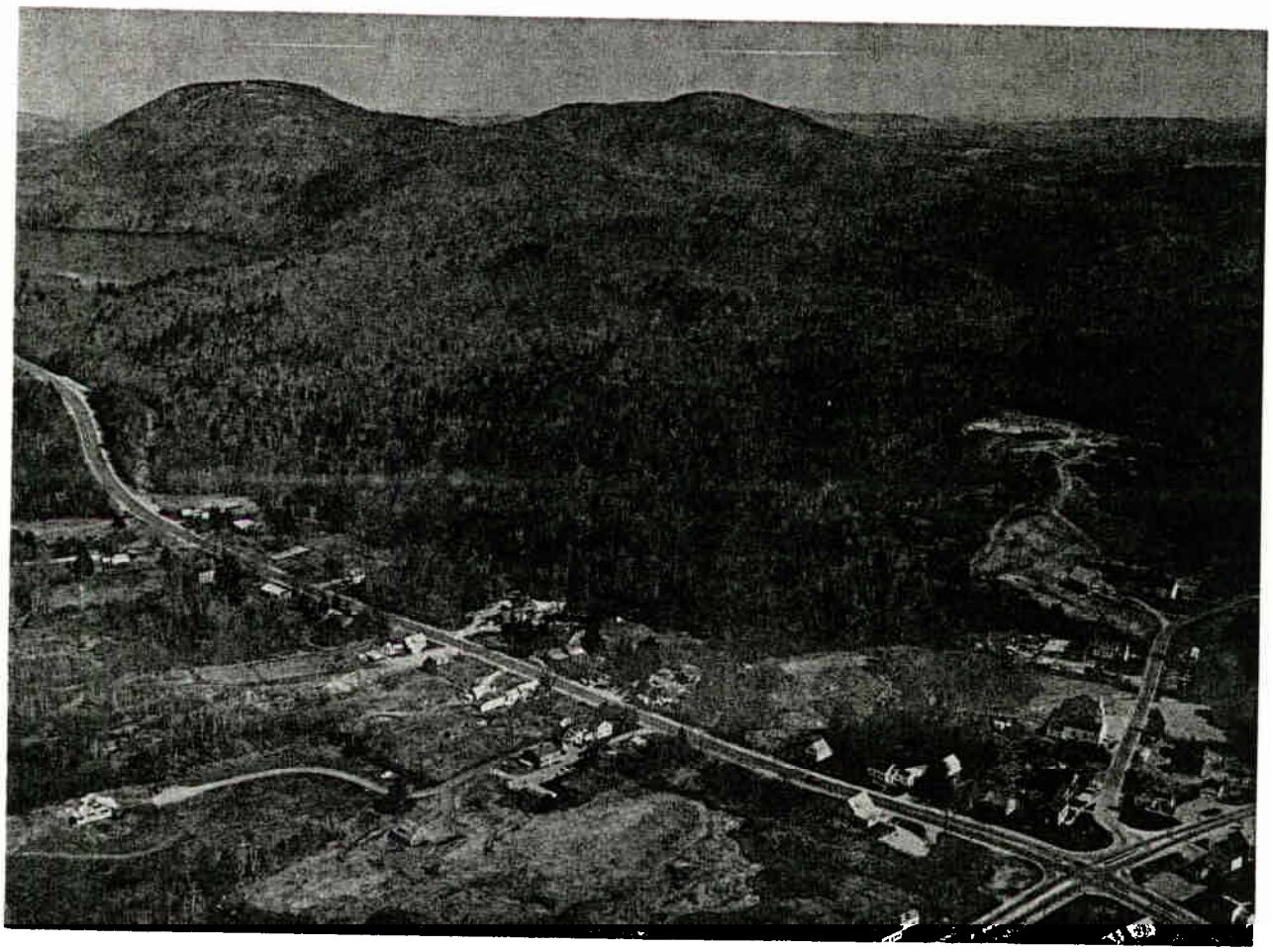


FIGURE 16b

An **axonometric** is a bird's-eye view of a three-dimensional drawing. This view is used to present the overall size (massing and bulk) of a structure. This is a technical design tool that is not often used in presentations. The human eye sees in perspective while an axonometric shows true dimensional mass. An axonometric tends to show more than a perspective and in that way presents more information to the viewer. It tends to be time consuming to calculate and therefore more expensive to produce.

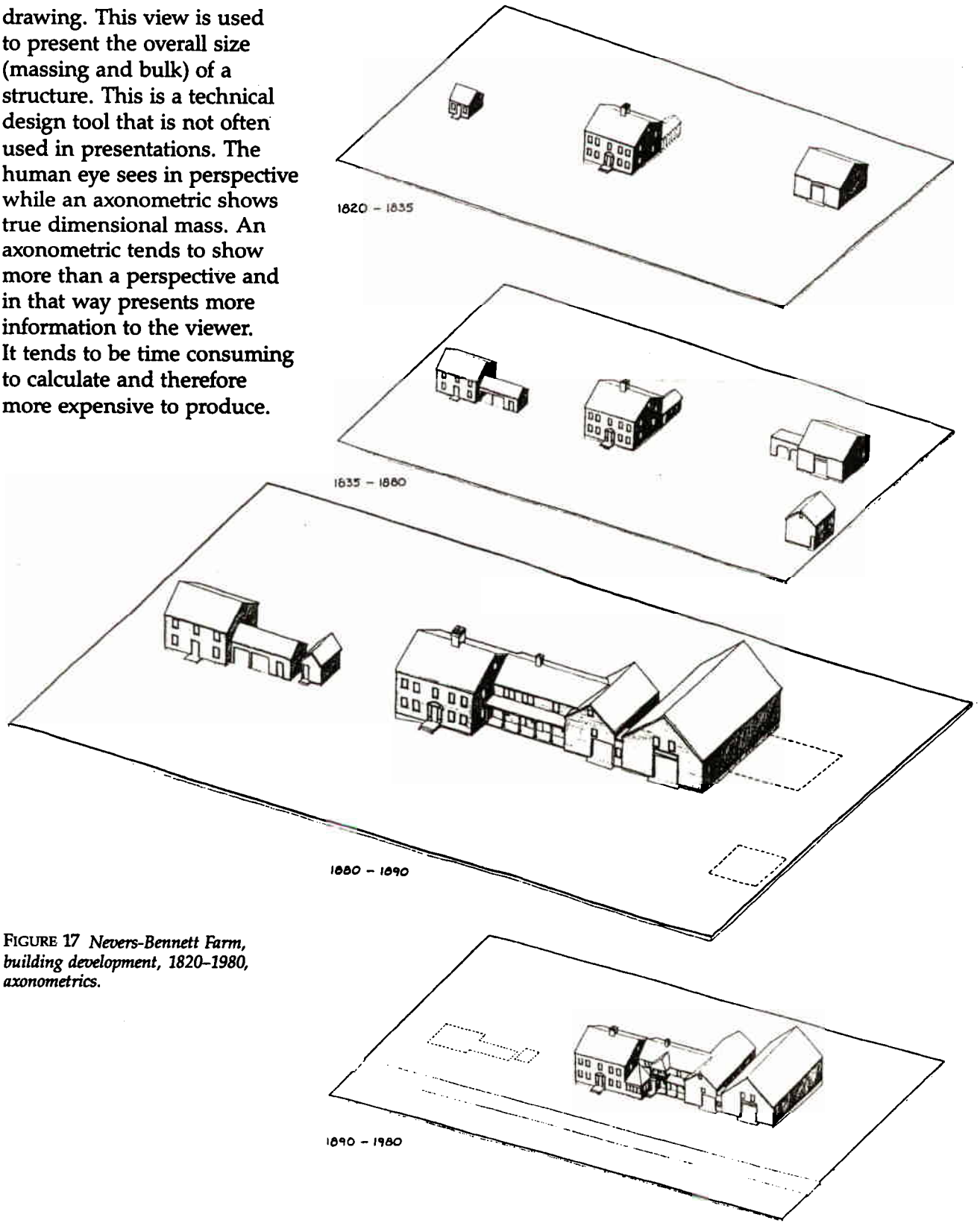


FIGURE 17 *Nevers-Bennett Farm, building development, 1820–1980, axonometrics.*

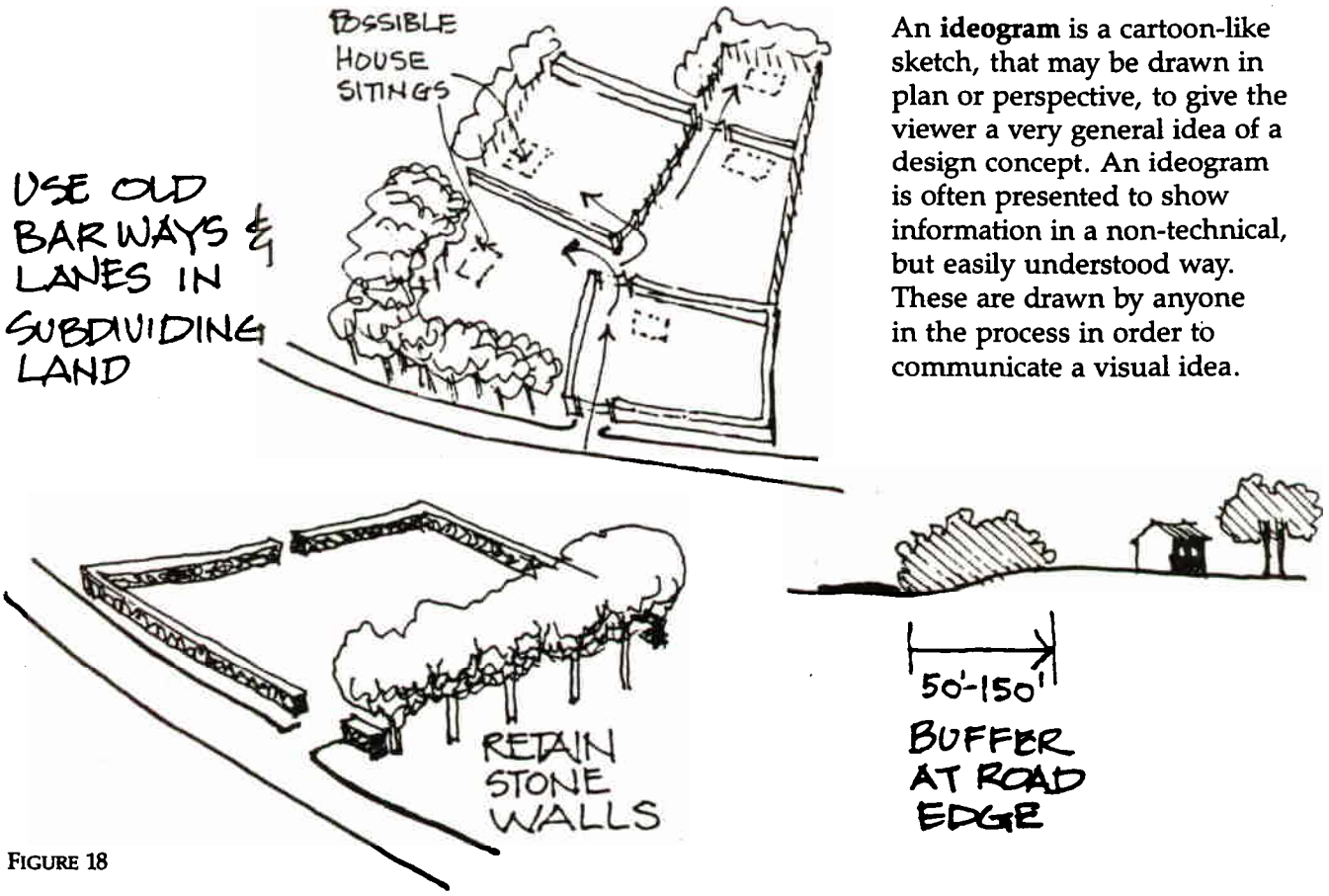


FIGURE 18

An **ideogram** is a cartoon-like sketch, that may be drawn in plan or perspective, to give the viewer a very general idea of a design concept. An ideogram is often presented to show information in a non-technical, but easily understood way. These are drawn by anyone in the process in order to communicate a visual idea.

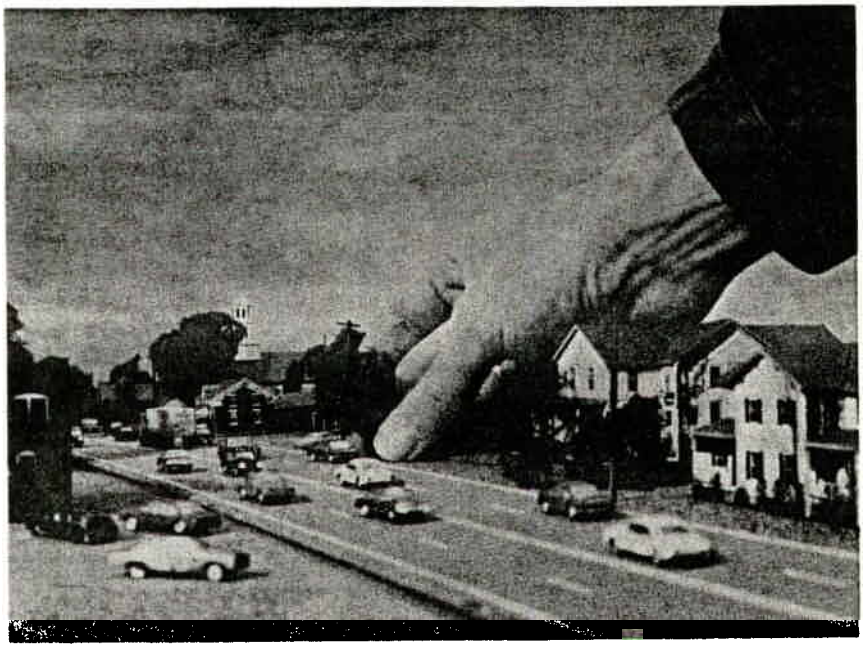


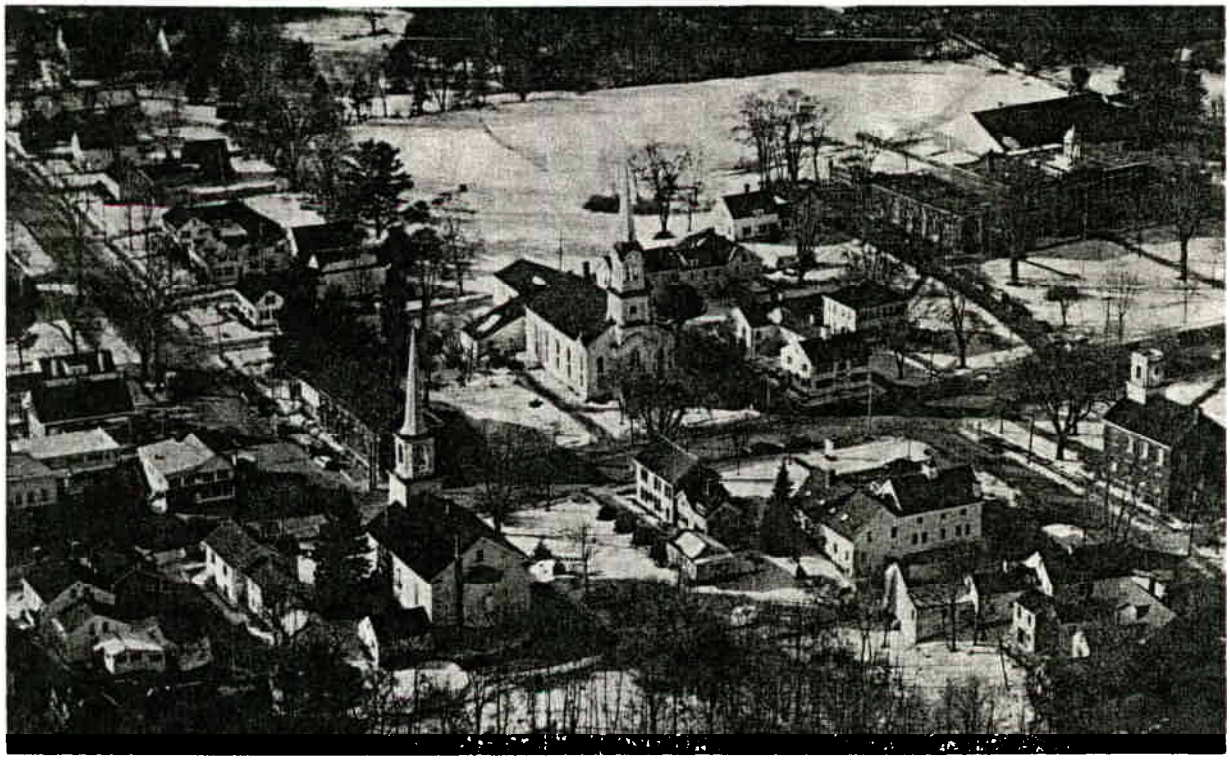
FIGURE 19

A **model** is a three-dimensional representation of a project. In general, models are used in large-scale or costly projects. Because space is three dimensional, models offer the best visual representation of a site. An important trend in planning is for towns to model key existing land areas. When new major development or road expansions are proposed, these are done to the town model's scale and inserted for review into this base model. For more information on models, see *Appendix A, How to Build a Model.*

A **computer model** is intended to present the same three-dimensional representation of a project as a model. While it can be less expensive than constructing a model, the detailed measurements required keep the cost relatively high and the technology is not as readily appreciated and recognizable as a physical scale model.

While technique may vary somewhat, in general, existing conditions are photographed using a 35mm camera and 50mm lens (Figure 20). The location and orientation of each photograph is determined and located on a plan of the area. Many photographs are taken from pertinent vantage points, and sometimes weather balloons or flags are set to mark the outline of proposed structures.

FIGURE 20

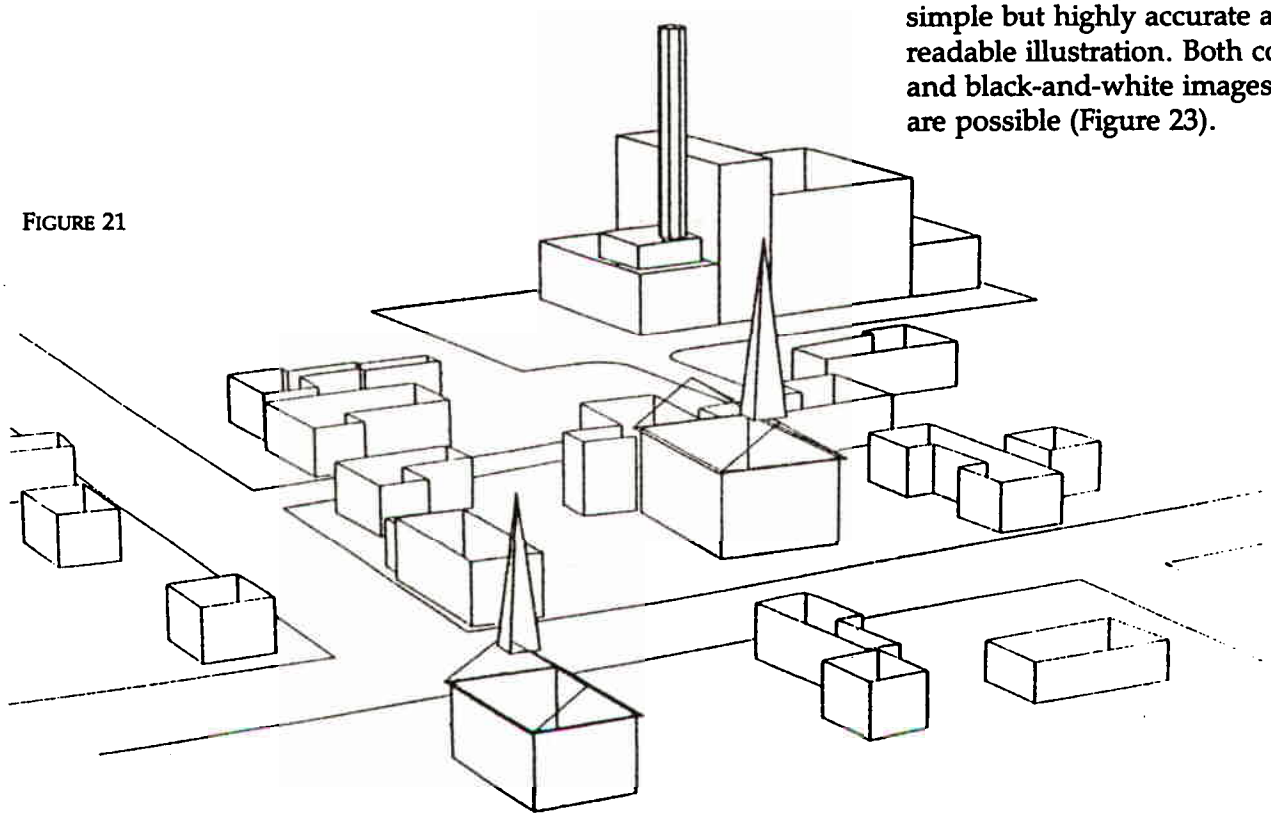


The elements of the proposed design and some existing structures are drafted in computer software, such as AutoCad, a two- and three-dimensional computer drawing program. From this data, three-dimensional views are created to match the location, angle of view and lens focal length for each photograph. The wire frame image illustrates the extent and forms of the proposed design elements (Figure 21).

The wire frame construction is then matched exactly to the photograph and the two are enlarged to the desired presentation format (Figure 22).

A freehand tracing is made of the sandwiched image and appropriate shading and color are added. The product is a simple but highly accurate and readable illustration. Both color and black-and-white images are possible (Figure 23).

FIGURE 21



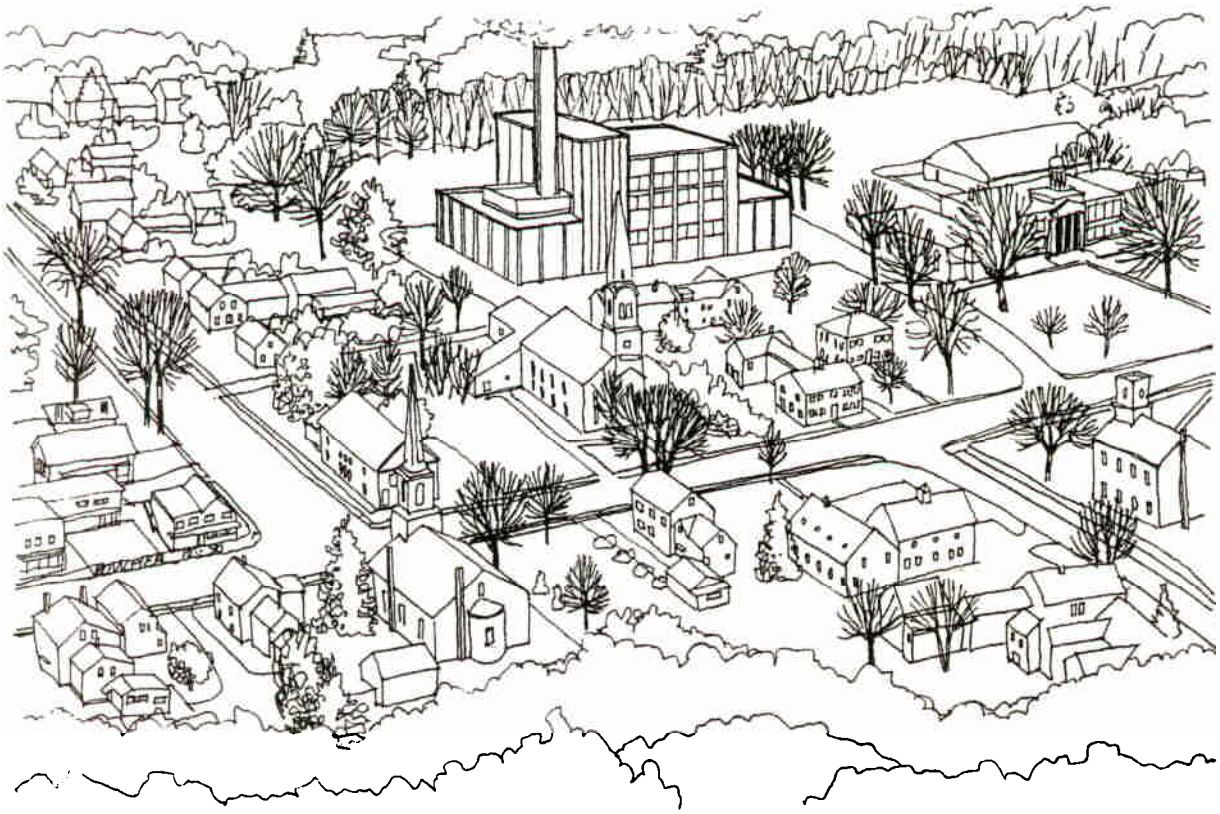


FIGURE 22

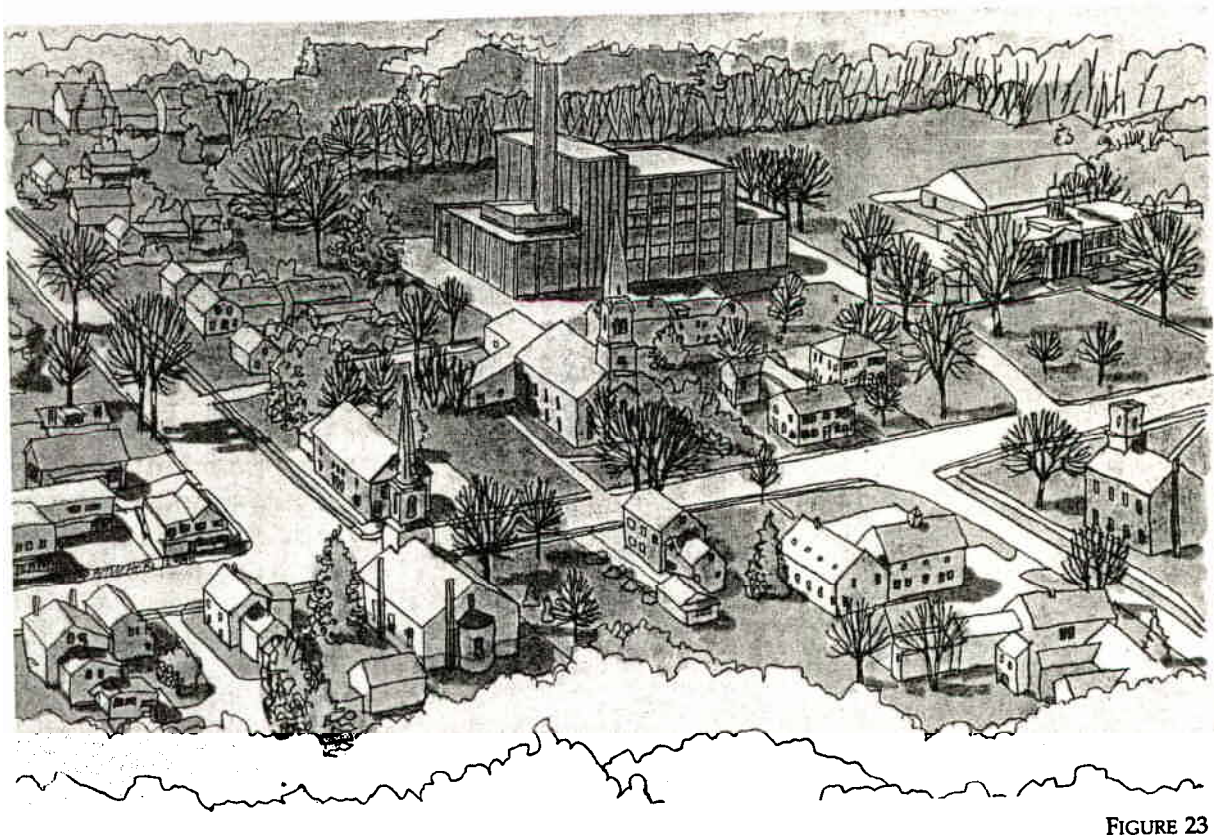


FIGURE 23

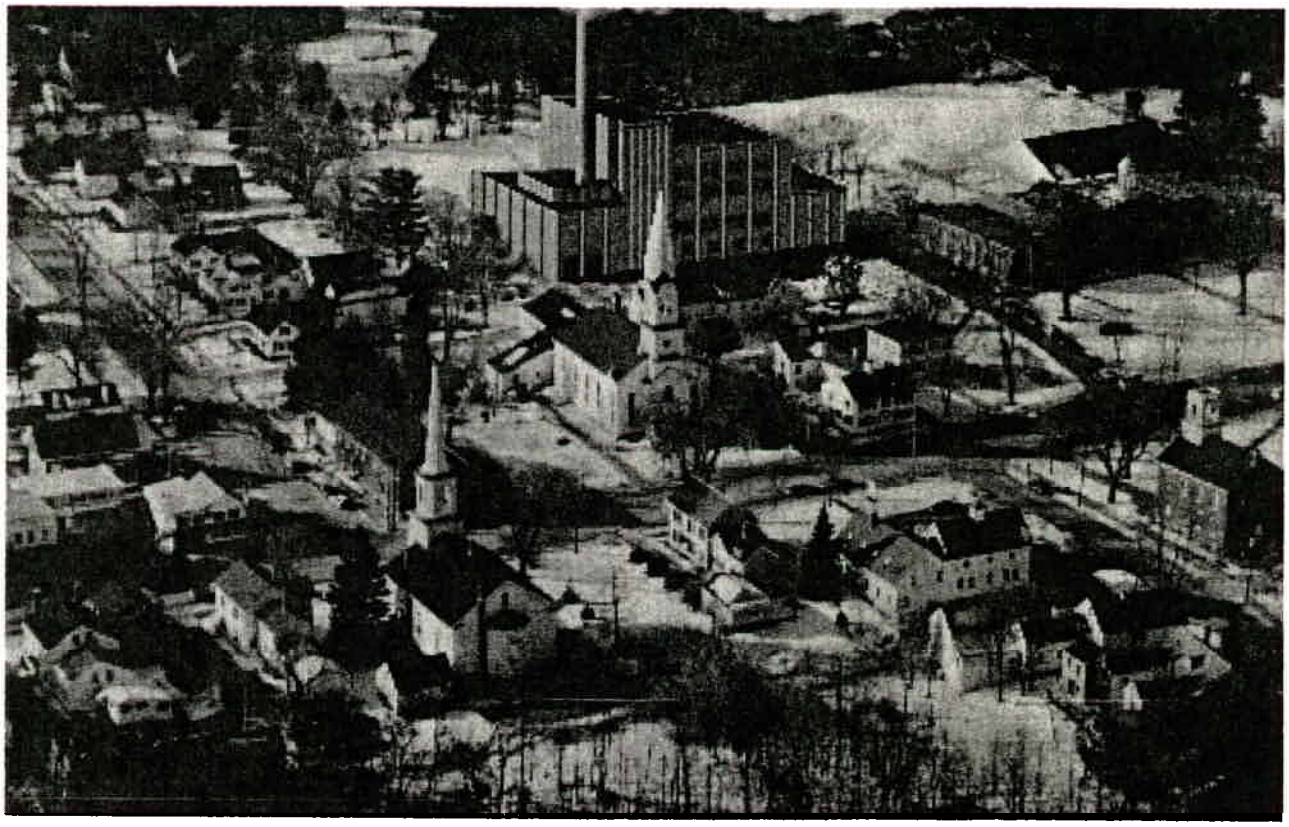


FIGURE 24

For a more realistic image, the combined photograph and wire frame construction are transferred to other design software, in this case **Image Studio,** a digital illustration program run on the Macintosh computer. The photograph is then rendered, pixel by pixel to create a realistic shaded gray image of the proposed design changes (Figure 24). This program is limited to black-and-white reproduction. Other software programs are capable of full color reproductions.

A **schematic** is a general term for a designer's sketch, that may be drawn in perspective or plan, to give the viewer a very general idea of a design concept. It is often used to present estimates of density or square footage. A schematic is usually presented to officials before the designer and the client have enough information to produce maps, plans, or elevations.

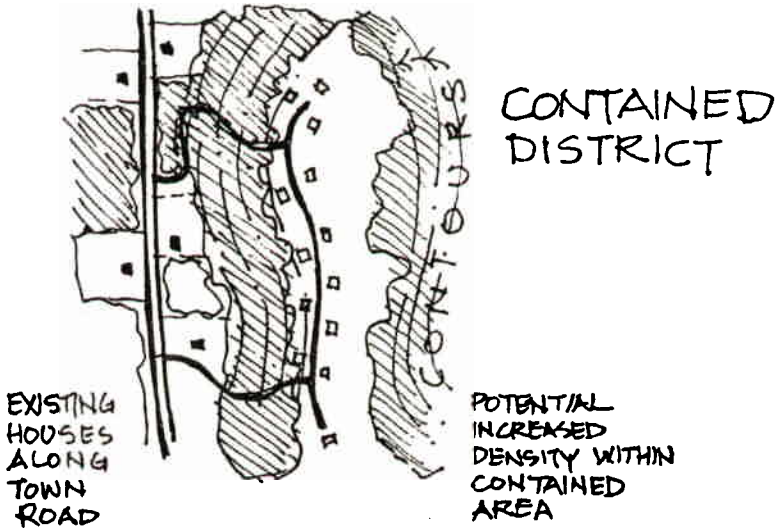
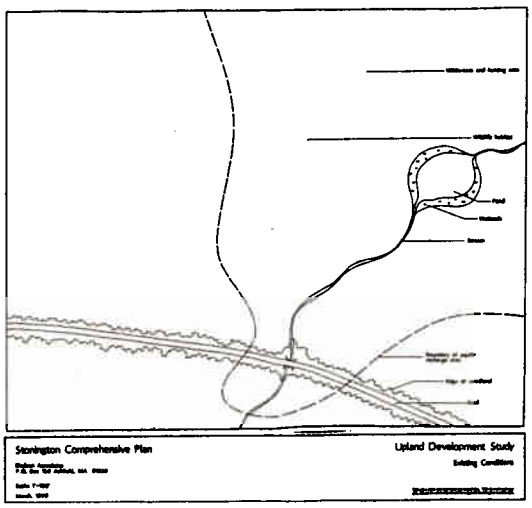
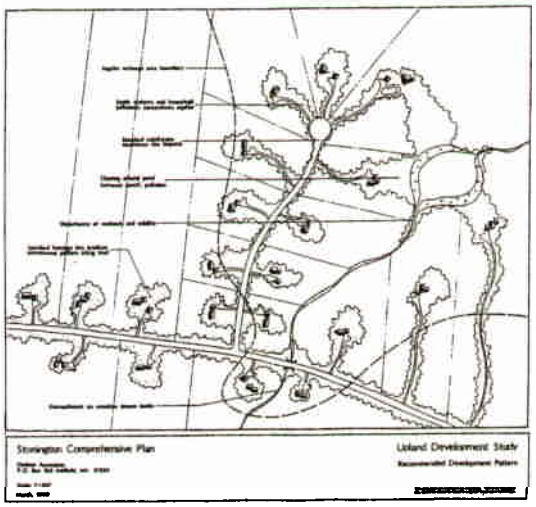


FIGURE 25





A **triptych** (trip-tic) shows three views of a site. It may show existing conditions, what development the current land use laws permit, and a development the designer is recommending. Triptychs may be used in cases where a designer wants to present a project according to current zoning standards and also to show how a variance would result in a better development for the town.

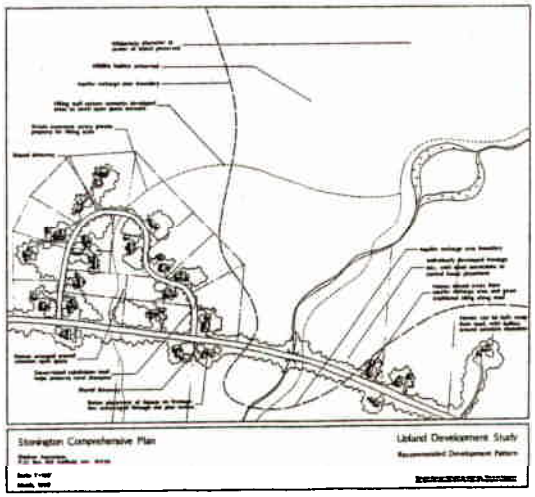
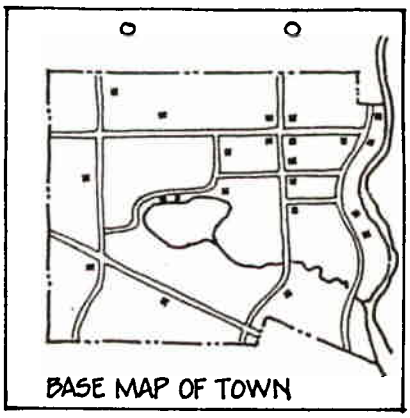
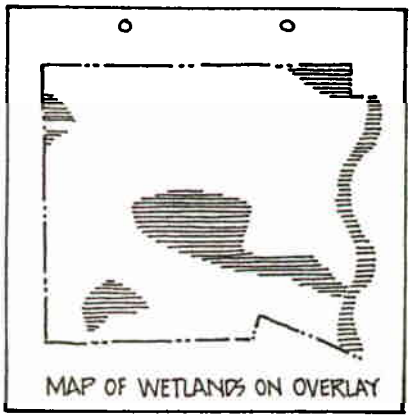
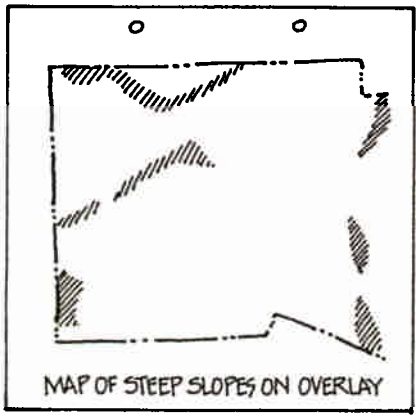


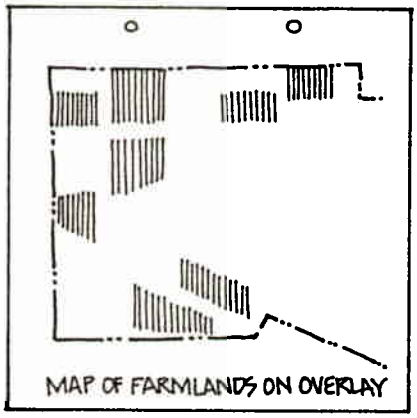
FIGURE 26

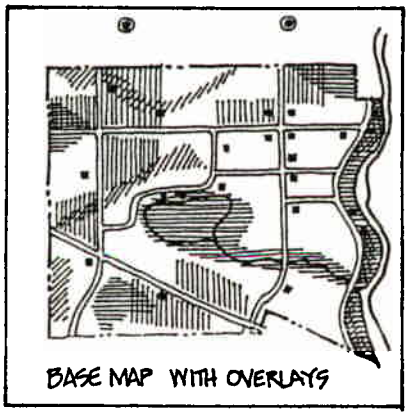


An **overlay** is a series of maps drawn to the same scale on see-through paper or acetate that are used together to show different resources. This information can include aquifers, wetlands, animal habitats, historic sites, etc. Overlays are used to orient decision makers to the physical placement of the proposed development.









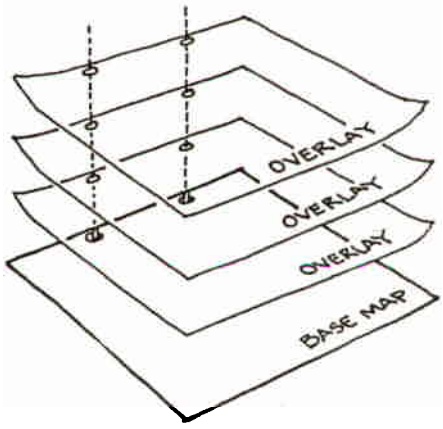
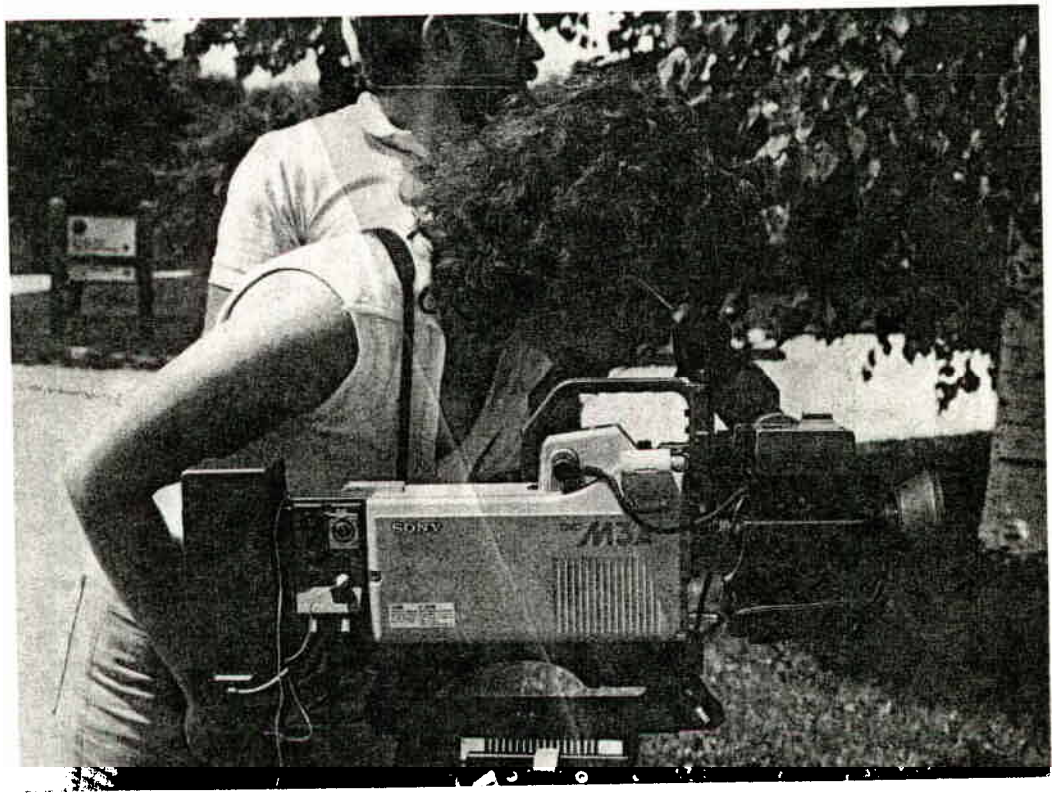


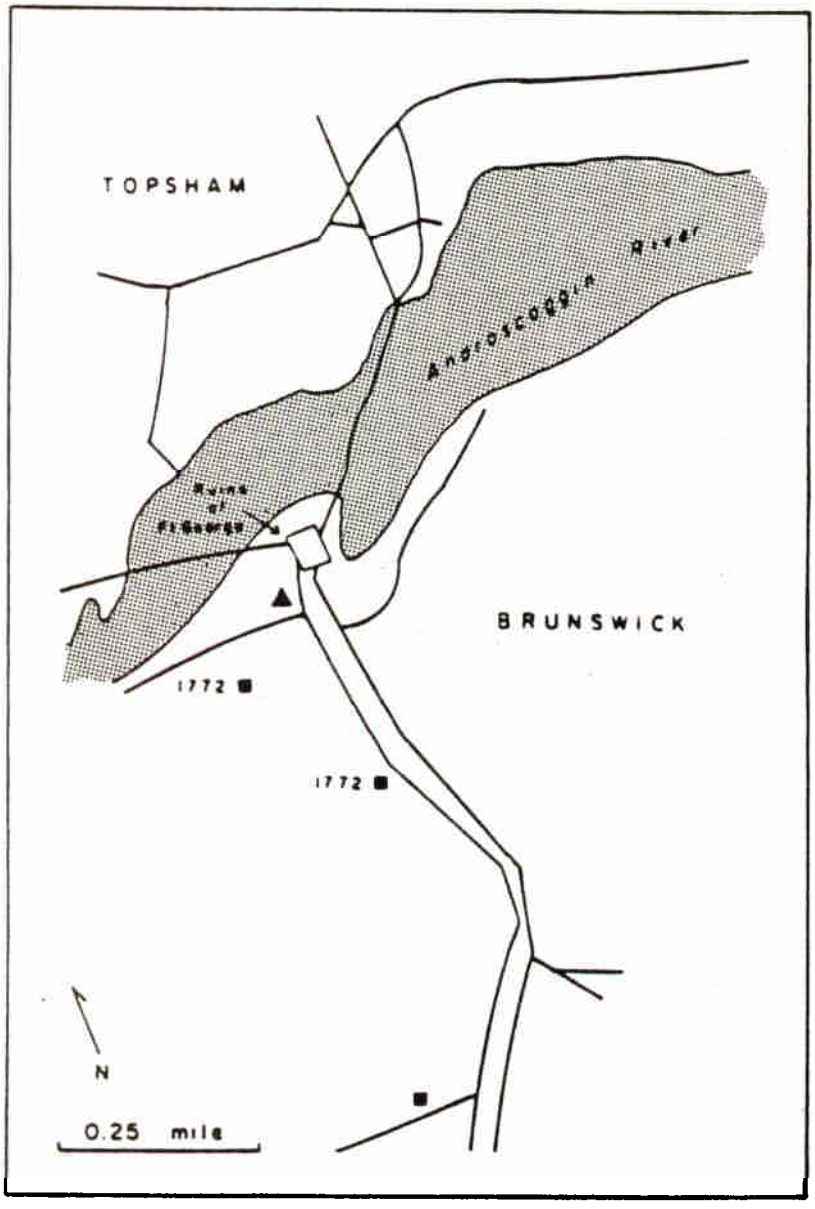
FIGURE 27

A **video** can be prepared and used much like a photograph – to orient a viewer to the physical layout of a site. A **synthesized image video** can be prepared through computer software imagery, similar to the computer model process, to show how a project would fit into the existing landscape.

FIGURE 28



ASSESSING THE VISUAL IMPACT OF LAND USE LAW DIMENSIONS



1780

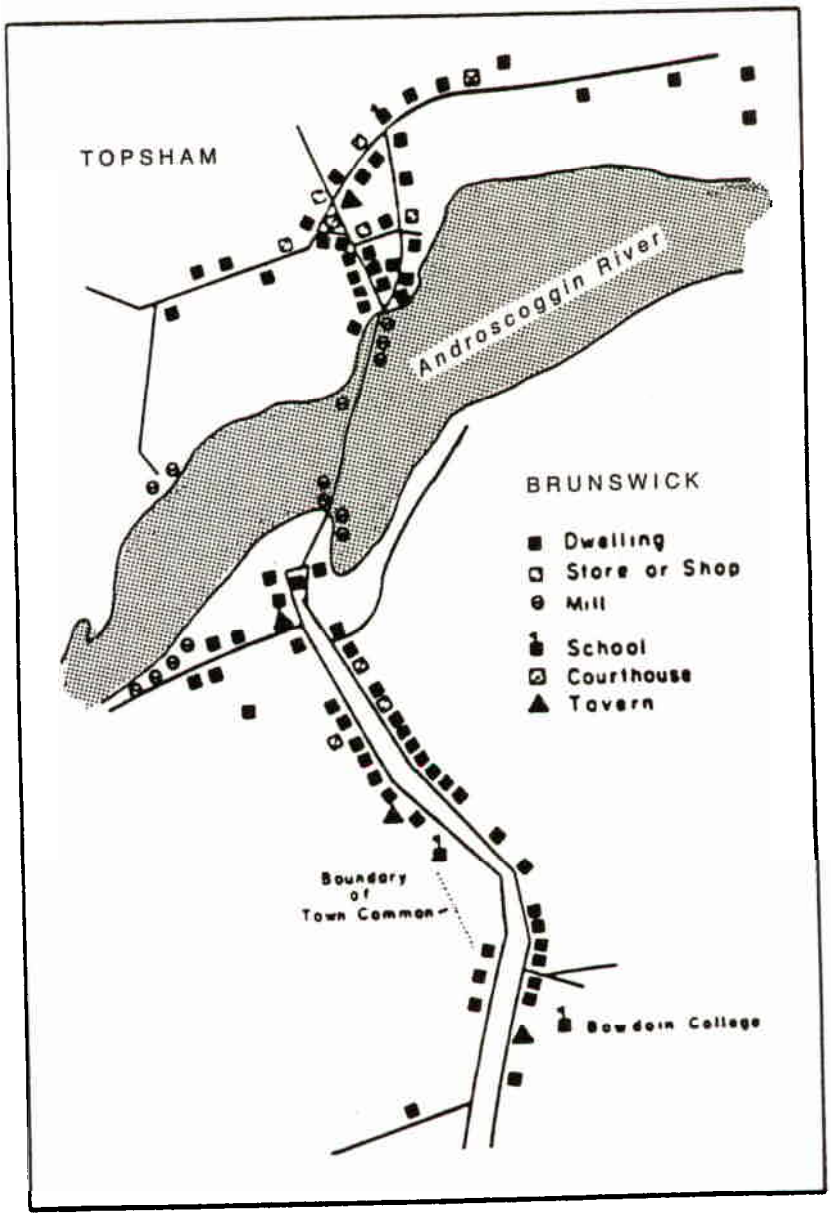
Introduction

In order to assess the visual impact of land use regulations on the future of your town, you may want to look first at two considerations – how your town is laid out and its historical and current economic development. Accounting for these two factors may help you to design ordinances that are well suited to the nature and feel of your town.

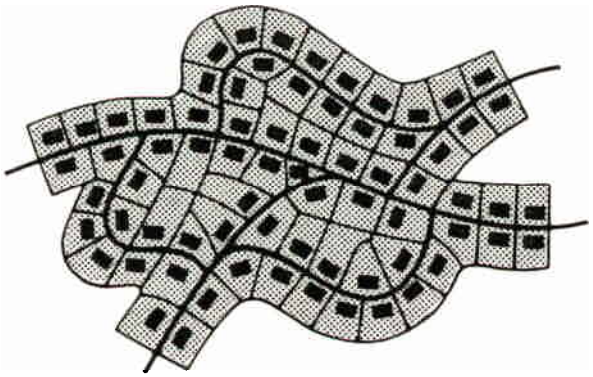
The settlement patterns and rural character of New England towns are based on European

FIGURE 29
Maps of Brunswick and Topsham, 1780 and 1802.
(Based on maps from "The Origins of the New England Village" by Joseph Wood [Ph.D. dissertation, Pennsylvania State University, 1978])

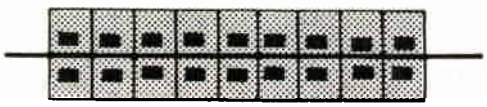
traditions that are much older than American zoning laws. These European traditions include common settlement patterns such as a concentric configuration, linear or grid pattern, scatter pattern, and water-oriented configuration (Figure 30). Before drafting land use ordinances, look to historical records, maps, and roadways to determine the original settlement patterns – that is, how the town was originally planned or developed. If possible, incorporate the most relevant of these into the overlay map system.



1802

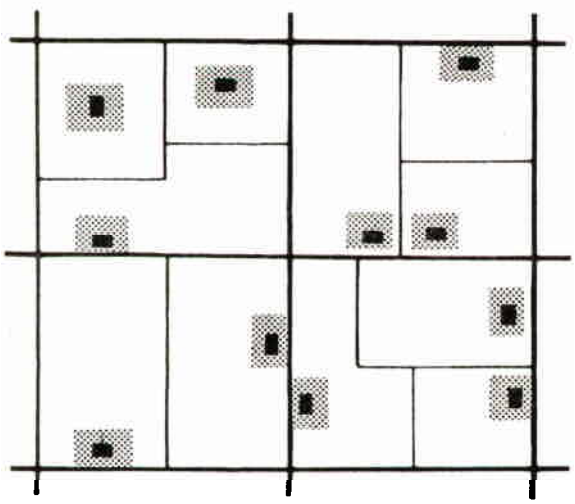


(a) Irregular clustered village



(b) Street village

(c) Green village



(d) Isolated farmsteads, unit-block farms

The economic reasons for the settlement patterns are equally as important as the settlement patterns themselves. While the original settlement pattern of the town explains *how* the town developed, the original economic interests of the town explains *why* the town developed. Economic interests in New England towns include mills, quarries, fishing, agriculture, and tourism. Philip Loheed suggests that planning board members consider the following historical questions to assess the true character and origin of their town:

What is or was the original reason for the location of the community? Fishing? Timber? Defense? Farming? Transportation? Trading? Manufacturing? Who were the important figures in the early history of the place, and what were their backgrounds? What was the original "idea" of the community?

It is very rare except in modern times for a community to be formed without a clear idea of how it would or should look. What are the traditional materials and colors used in the community?

What building types are present? What are their sizes? Is there a significant variation in size? Are they typically "streetfront" buildings, "estates," or "farms"? Are the "best places" on the high ground? The eastern slopes?

The shore? These are important clues to the nature of the natural systems of the town's environment.

What is the character of the public places? A green? A park? A waterfront? What elements of public access are significant? Trails? Beaches?

What are the traditional ways of sharing in the community? Should they be accommodated and preserved?

What places should be reserved as natural habitat, either managed or forever wild? Should this system be continuous from place to place? What is the "magic" of the place? How can it be protected? Is it gritty? Elegant? Slow? Fast?

Once planning board members have considered these factors, they should then decide if they want to continue the original growth and rural patterns to maintain the traditional character of their town or revise them in order to craft laws that best reflect the current existing growth and new rural patterns.

This chapter will provide you with ideas on how to match future development with the character of your town. The ideas presented will help you visualize, with the help of common design tools, the impact your land use regulations will have on your town.

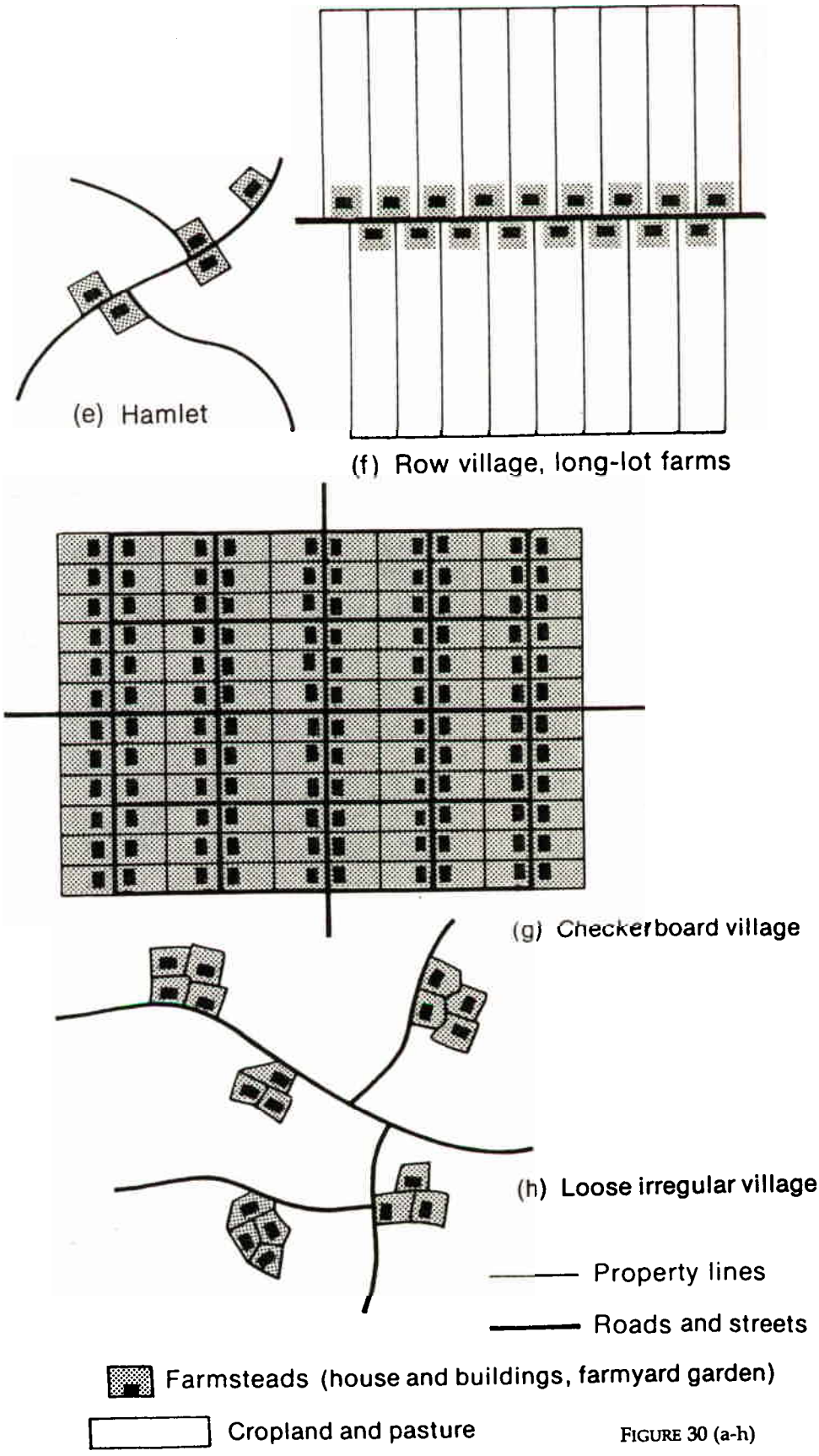


FIGURE 30 (a-h)

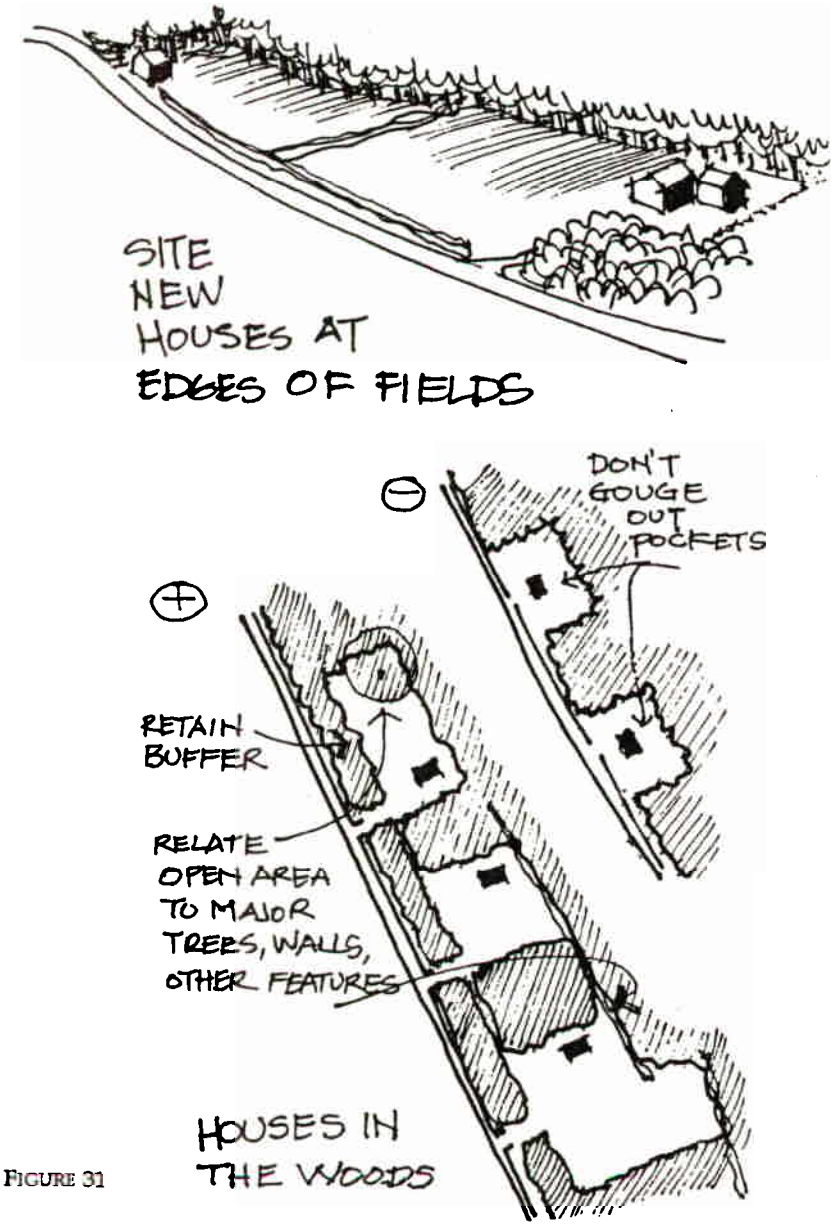


FIGURE 31

Rural And Growth Areas

Towns may use zoning laws in an attempt to control density – that is, to keep population scattered in the most rural areas and to allow more living units and people in the settled, growth areas. Thinking of your town in terms of rural and growth areas helps you to determine *where* you want to grow and *how* your land use regulations should be written to reflect that decision.

The distinction between dimensions for rural and growth areas might be based on defined locational criteria (Figure 32). Michael Everett offers the following types of locale to help make this distinction in your town:

- Criteria for associating growth with already built-up areas which recognize existing building types and lot placement (town or village centers)
- Criteria for growth areas near to but not actually adjacent to town or village centers
- Criteria for growth areas in rural, non-urban sectors

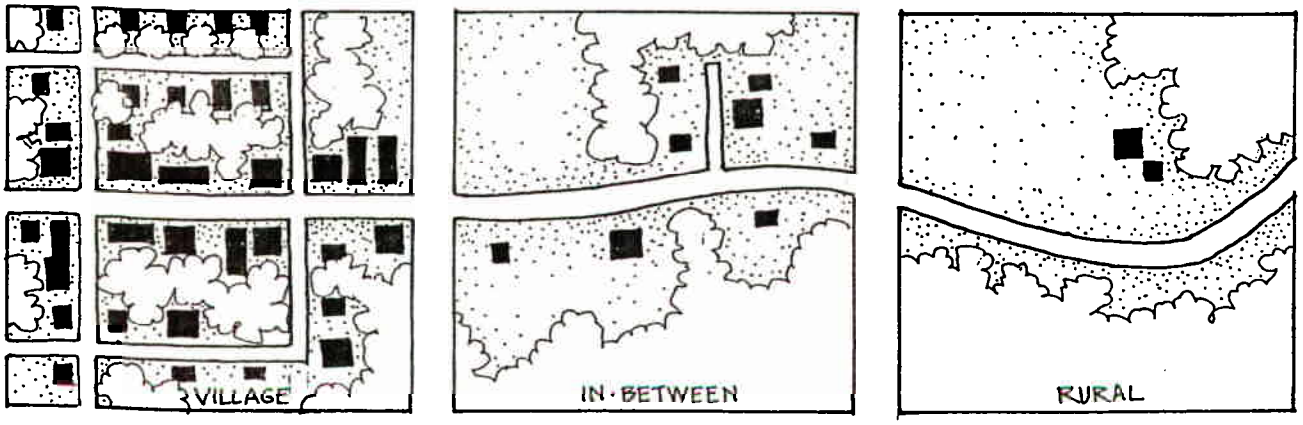


FIGURE 32

Sample State Dimensions

The state manual, *How to Write a Land Use Ordinance,* provides a chart of sample dimensions for rural and growth areas (Figure 33).

Although this chart offers a useful format, any numbers used need context to help define their boundaries. On the following two pages, Steve Theodore uses the dimensions provided in the state manual to visually compare the minimum lot areas, land areas, street frontages, and setbacks for rural and growth areas.

Illustrating numbers allows you to see what the numbers actually look like in both rural and growth areas and allows you to answer the following questions: Do you like or dislike the way these numbers look? Does the proportion between the rural and growth areas complement the character of your town? Do you need to increase or decrease any of these suggested numbers in relation to each other to agree with the desires of the town? Should you consider ranges of numbers for specific sites you have identified in your comprehensive planning process? If your community is characterized by diverse land use patterns, how will dimensions reinforce this pattern if that is desired?

DIMENSIONS	Growth Dist.	Rural Dist.
Minimum lot area (square feet)*		
With public sewer	10,000	NA
Without public sewer	30,000	435,600
Minimum land area per dwelling unit		
With public sewer	5,000	NA
Without public	20,000	435,600
Minimum street frontage	50	100
Minimum setbacks (feet)		
Front setback	25	100
Side setback	10	25
Rear setback	15	25
Maximum lot coverage (%)	25%	5%
Height limits	50'	35'

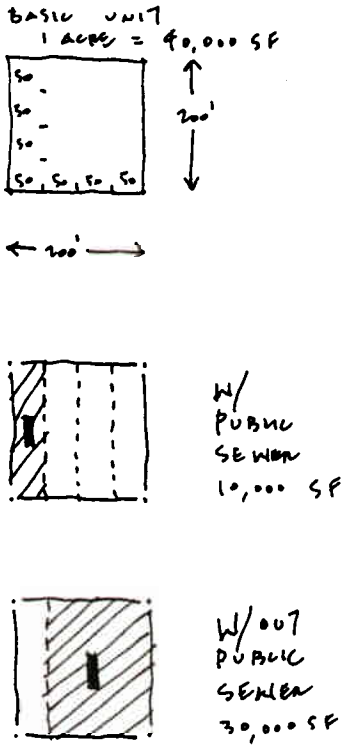
* Minimum area of a mobile home park lot shall be 6,500 square feet where served by a public sewer system, and 12,000 square feet where served by a central on-site subsurface waste water disposal system, and 20,000 square feet with on-site subsurface wastewater disposal.

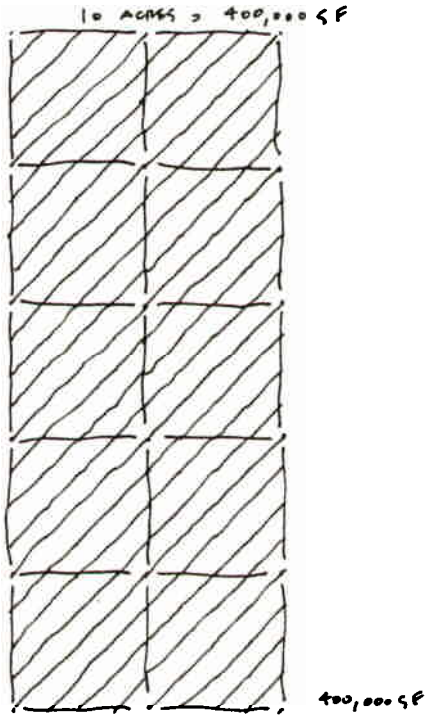
NOTE: Minimum land area per dwelling unit establishes density requirements for multi-family and cluster developments. Density requirements for mobile home parks are derived from the Mobile Home Park Law's minimum park area requirements.

NOTE: Maximum lot coverage is a method of controlling the size and bulk of a building(s). Another approach is to regulate the amount of impervious surface. Impervious surface relates to all impervious surfaces such as buildings, roads, parking areas, and patios that increase stormwater runoff and can lead to adverse environmental impacts.

FIGURE 33

MINIMUM LOT AREA



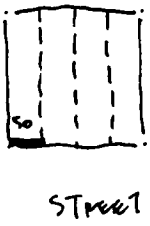


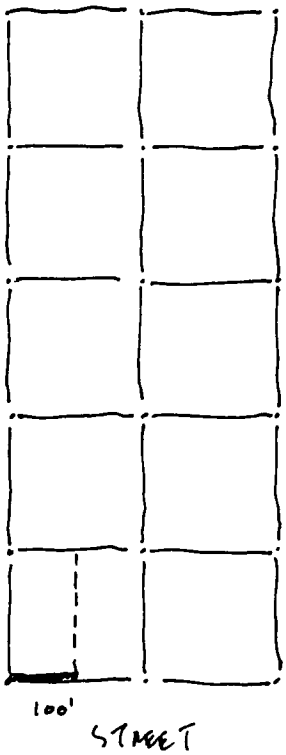
GROWTH DISTRICT

RURAL DISTRICT

FIGURE 34

MINIMUM STREET FRONTAGE



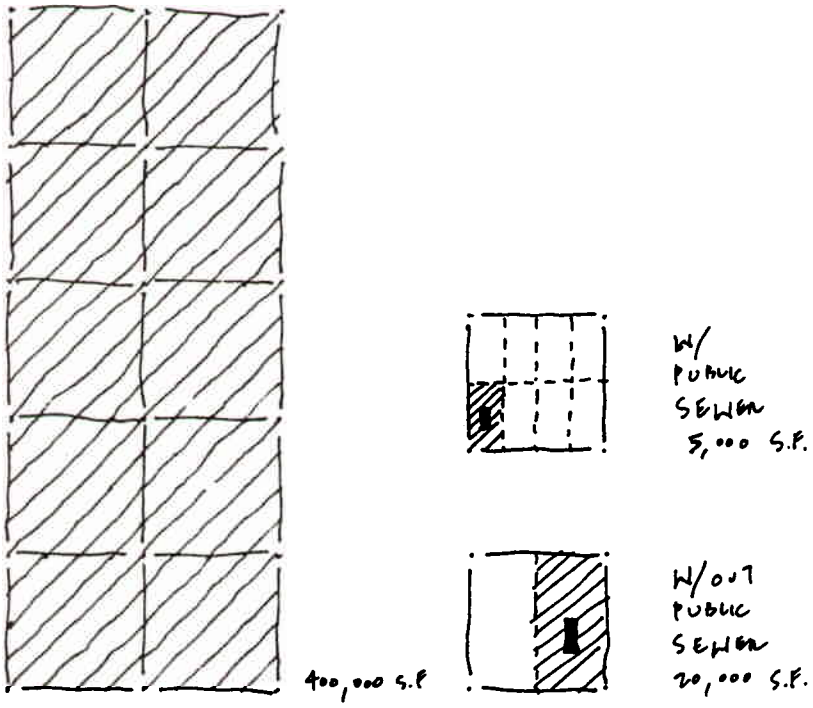


GROWTH DISTRICT

RURAL DISTRICT

FIGURE 35

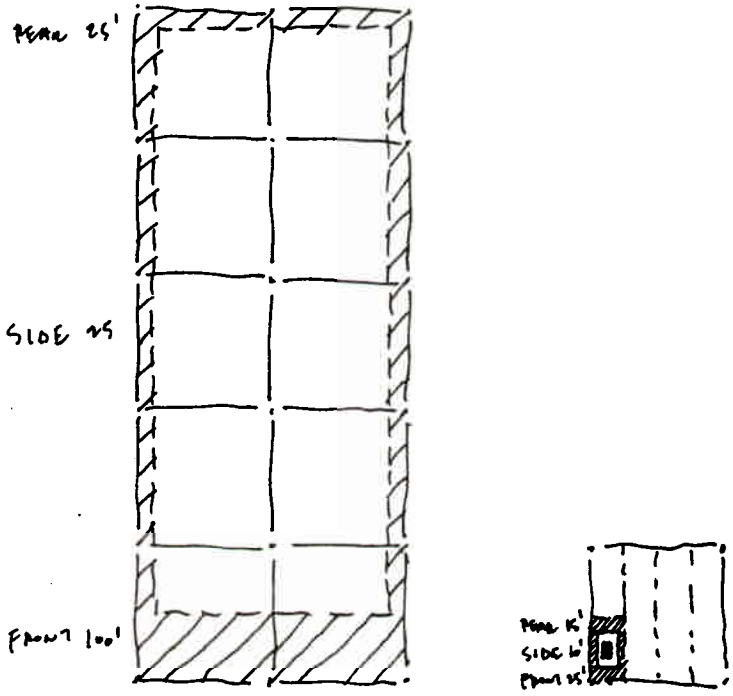
MINIMUM LAND AREA / D.U.



RURAL DISTRICT **GROWTH DISTRICT**

FIGURE 36

MINIMUM SETBACKS



RURAL DISTRICT **GROWTH DISTRICT**

FIGURE 37

Overlay maps usually depict identified existing resources. Once these are prepared, an additional set of overlays with dimensional alternatives for lot sizes, frontages and setbacks could be prepared. This is one aid to understanding and crafting appropriate local dimensional standards for as many different zones or areas defined by the community plan as desirable. To make the exercise meaningful, property boundaries (with owners identified) and the local and state road system should also be included.

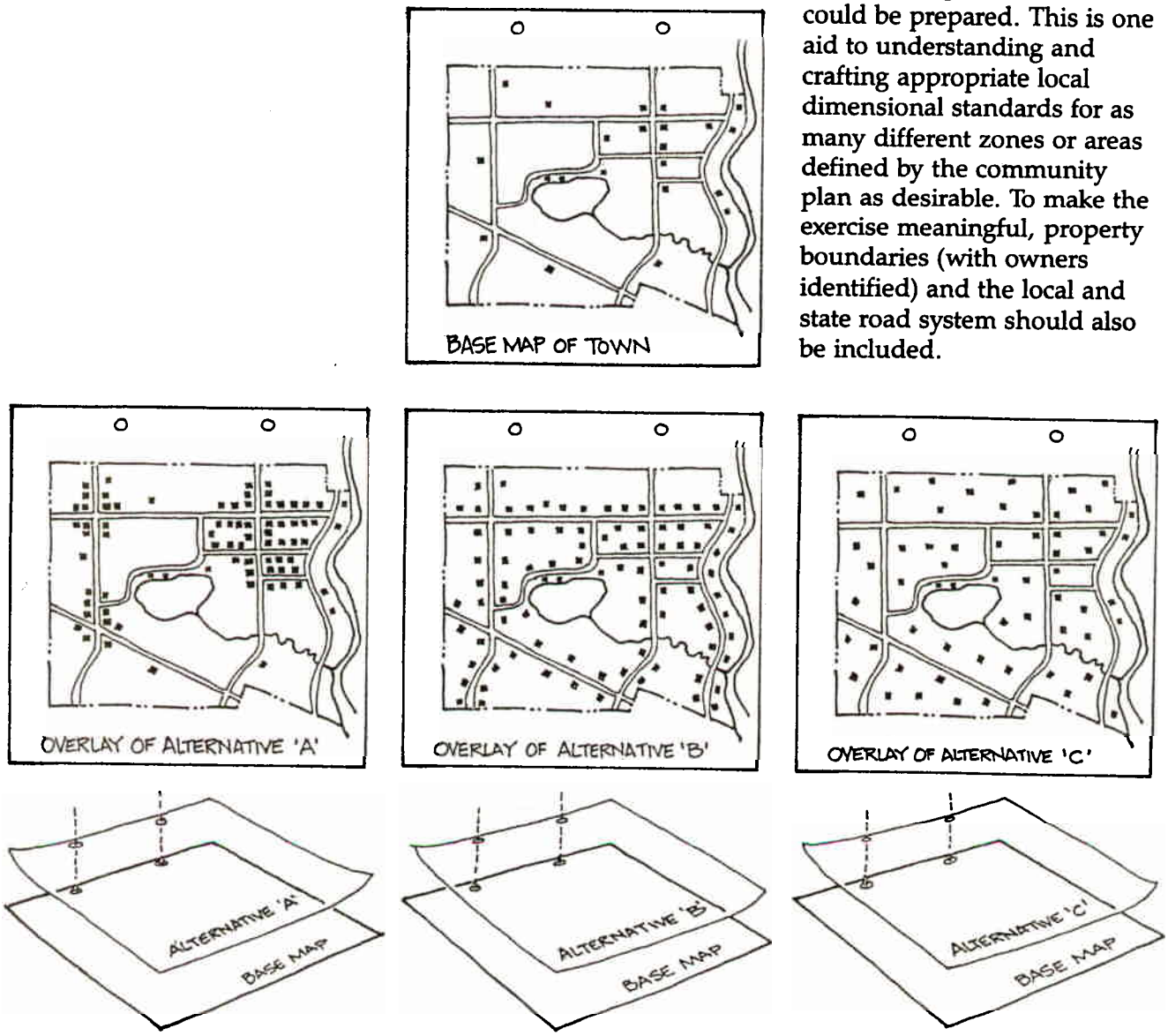


FIGURE 38

Stating the intent of a land use regulation and testing it by illustration will serve to inform both the policy makers and the marketplace about how a community wants to grow and can grow appropriately. The illustration in Figure 39 shows one possible configuration of 5% maximum lot coverage of a ten-acre rural lot. This drawing re-emphasizes the point of how frontage and setback dimensions are as important as lot size in how development will be viewed along rural roads. When drawing contrasts between rural and growth areas, scale can sometimes be a problem. Note the illustrator's reference to her inability to depict the full view of the rural drawing by using a break symbol.

Loheed suggests that the easiest way for people to visualize what something will look like in their town is to visit other places that have the desired characteristics. Using an overlay, to scale, of the desired plan in their own town provides a way of testing several alternate "dimensional systems" in a rapid, understandable way.

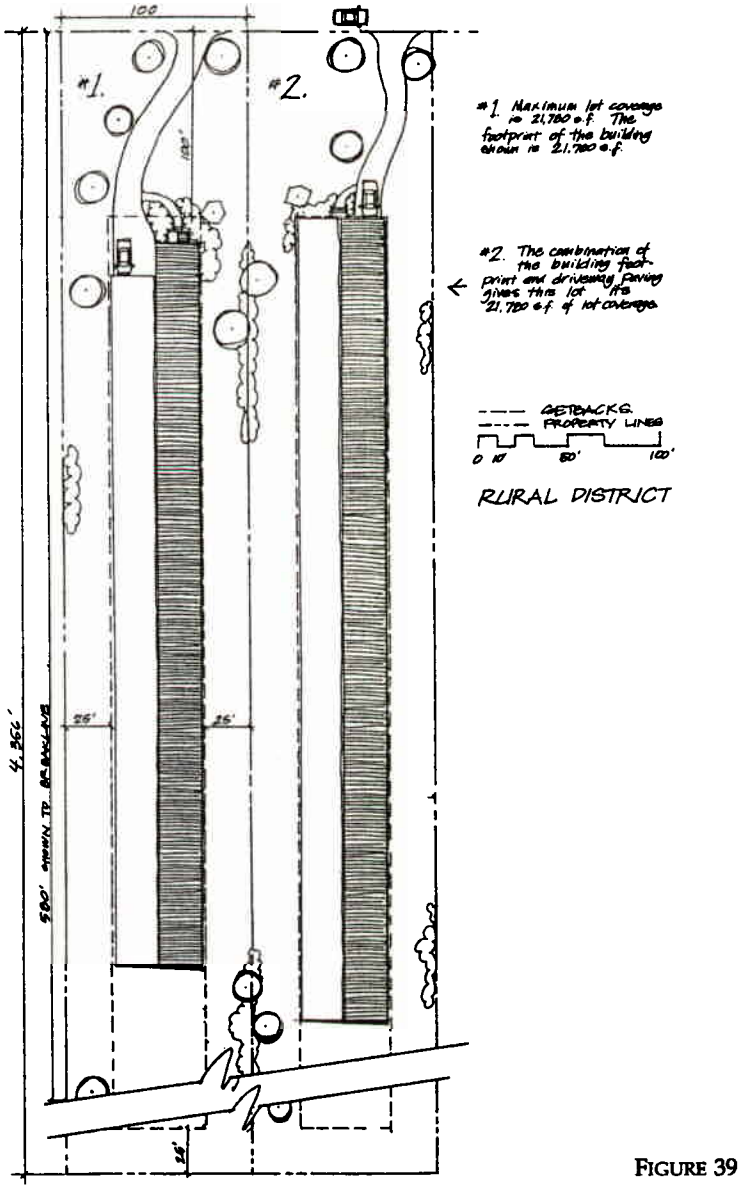
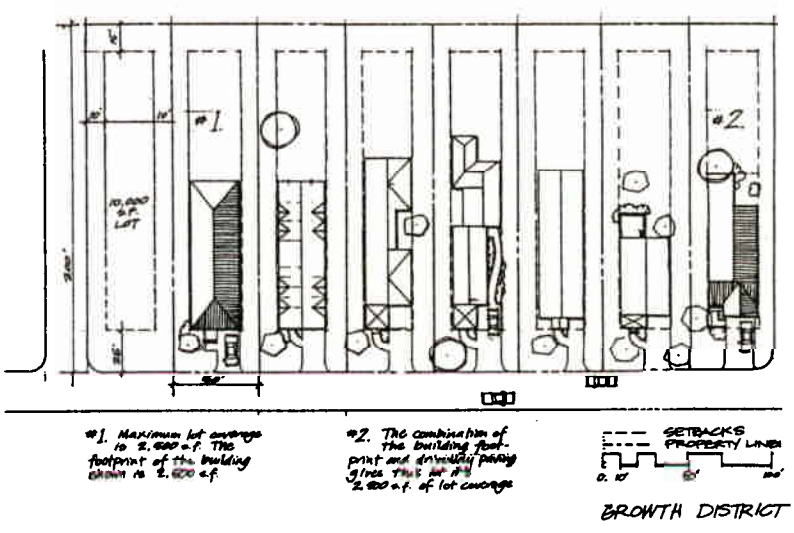


FIGURE 39



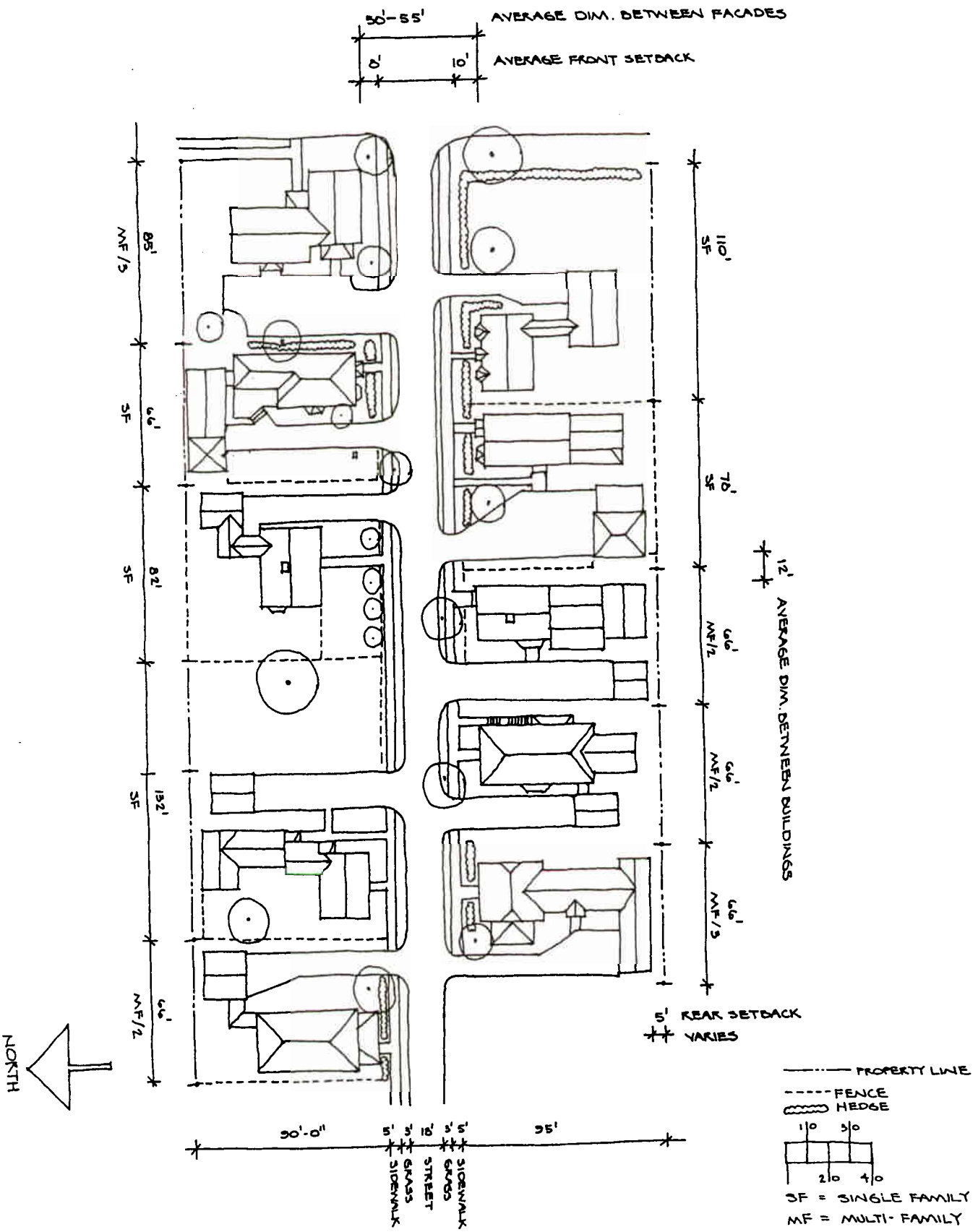
Street Frontages

Steven Moore's diagram of School Street in Brunswick, Maine, shows the measurements of actual street frontages and the arrangements of the structures, walls, and vegetation that create the space.

The variety of street frontages in Moore's illustration is noticeable. Without incentives or mandate, economics usually dictate that a developer will not vary from the minimum per dwelling specified by the town. Research suggests that a community might consider minimum and maximum dimensions for frontages, as well as setbacks and lot sizes, to provide variety and diversity in communities with these historic patterns. Maximum rather than minimum setbacks, for example, in designated growth areas may be important if a community decides to create civic space in proportion to human scale.

FIGURE 40

A VERY PLEASANT STREET IN BRUNSWICK, MAINE. HOUSES ARE GENERALLY TWO AND THREE STORY WOOD FRAME BUILDINGS CONSTRUCTED BETWEEN 1870 AND 1910. APPROXIMATELY HALF THE PROPERTIES HAVE BEEN SUBDIVIDED INTO MULTI-FAMILY RENTAL UNITS, YIELDING A DENSITY OF APPROX. 20-25 PERSONS/ACRE. ON-STREET PARKING IS OCCASIONALLY A PROBLEM, AS IS SNOW REMOVAL. HOWEVER, THE SCALE OF THE STREET IS DELIGHTFUL.


50'-55'
AVERAGE DIM. BETWEEN FACADES
0'
10'
AVERAGE FRONT SETBACK
85'
MF/3
66'
SF
82'
SF
132'
SF
66'
MF/2
110'
SF
70'
SF
12'
AVERAGE DIM. BETWEEN BUILDINGS
66'
MF/2
66'
MF/2
66'
MF/3
5' REAR SETBACK
VARIES
NORTH
50'-0"
5'
3'
10'
3'
5'
35'
SIDEWALK
GRASS
STREET
GRASS
SIDEWALK
PROPERTY LINE
FENCE
HEDGE
1|0
3|0
2|0
4|0
SF = SINGLE FAMILY
MF = MULTI-FAMILY

In addition to the concept of flexibility in frontages and lot sizes, Everett also suggests that setback requirements could reflect the following:

- Prevailing standard if older neighboring structures
- Sufficient depth to retain an adequate buffer
- Pattern which recognizes the closer-to-the-road placement of historic dwellings and, therefore, sets new structures well back so the roadscape is dominated by older structures

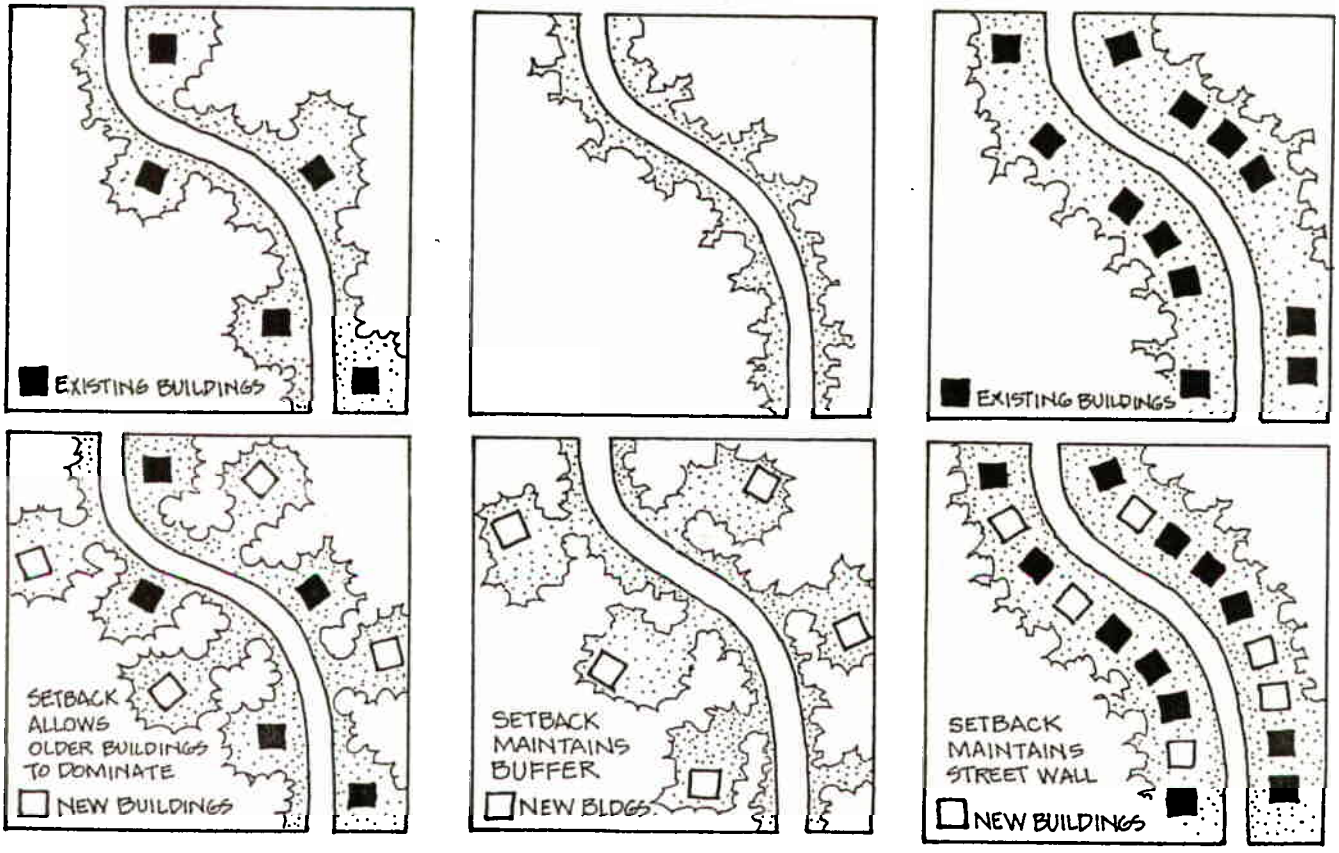
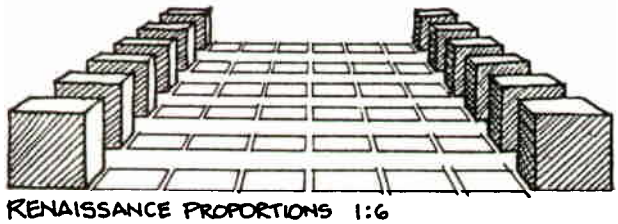


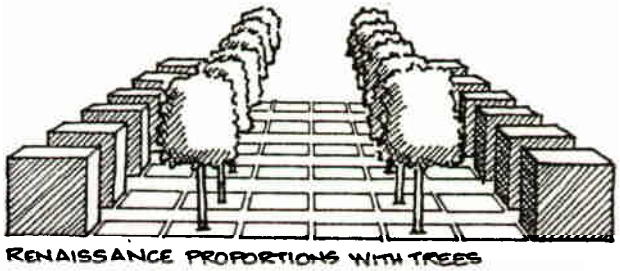
FIGURE 41

Ratio Of Height To Setback

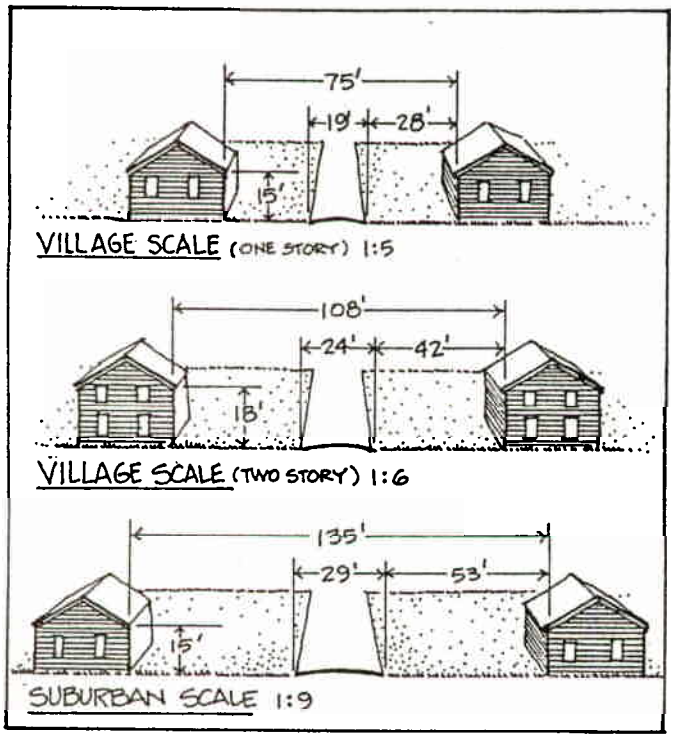
A proportion developed in the Renaissance still influences the way we feel about civic, public space. That ratio, 1:6, means that for every foot of a building's height, there should be no more than six feet of space in front of it. In fact, less space in front can be preferable. European villages – the source for most New England settlement patterns – often exhibit this ratio range, which is experienced as pleasing space.



RENAISSANCE PROPORTIONS 1:6



RENAISSANCE PROPORTIONS WITH TREES



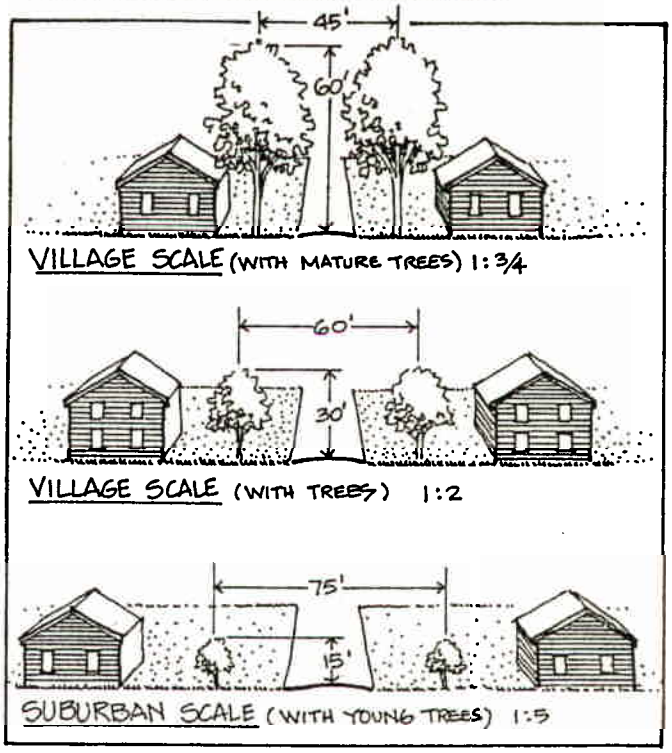


FIGURE 42

Andres Duany, a designer who is a proponent of neo-traditional town planning, suggests that a streetscape with a height proportion greater than 1:6 can be made pleasant by lining both sides of the street with trees. The trees then create the boundary for a pleasing proportion. In some New England village streets with two-story houses, 10-ft setbacks, and 18-ft-wide streets, the smaller proportion this creates produces an intimate village feeling, with or without tree lines, that is scaled to the pedestrian's benefit.

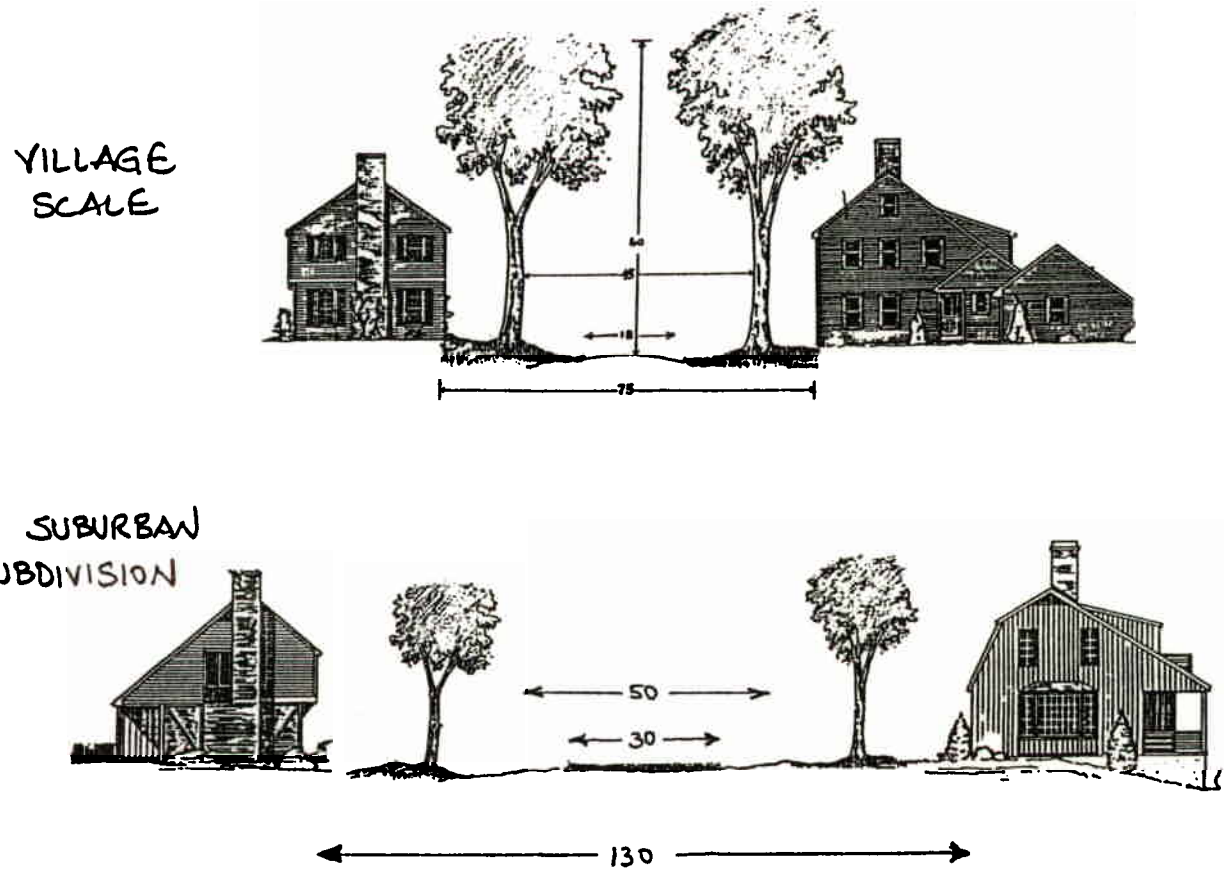


FIGURE 43

Lot Size

Everett suggests that minimum lot size should reflect existing lot sizes within each jurisdiction and should acknowledge existing boundaries as a means of integrating the new with the old. Also, minimum lot sizes should avoid creation of excessive fallow backlands at the rear of each lot and within "Rural Superblocks".

He states that there is a tendency to unintentionally encourage suburban siting everywhere. This issue should be addressed and specific ideas entertained, such as:

- Avoidance of mid-field siting, encourage edge of field for several reasons – preserves field as far-like in appearance and retains some farm use potential

- Avoidance of minimum clearing in the woods as development pattern along rural roads. Require a 50-100' planted buffer and clearance of sufficient land for good solar access to building

Lot configurations shall, as far as is possible, respect and retain all stone walls, laneways, fields, etc.: provisions should be made for adjustment of individual lots within overall aggregate compliance with lot size requirements. Familiar to most people in rural communities which have experimented with large lot zoning is that without careful consideration of other dimensional and design elements, it does not protect visual rural character.

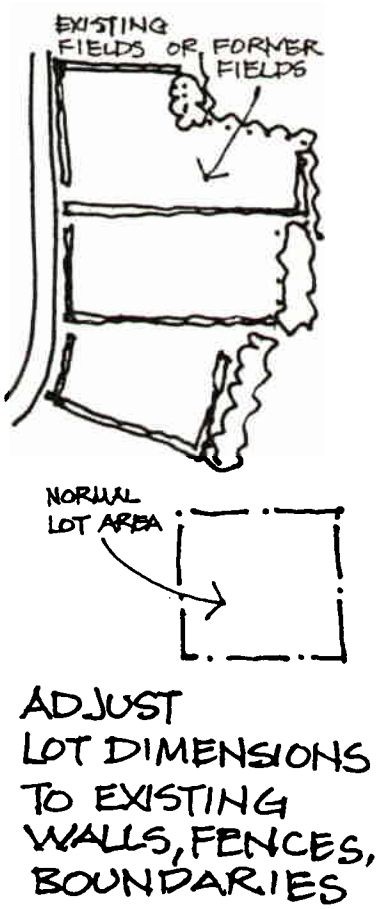


FIGURE 44

Large lot zoning is used primarily to address lower rural population density but is not necessary, with appropriate dimension and siting guidelines, to maintain visual rural character.

Figure 45 shows where there are lots allowed flexibility in size as long as the subdivision has the required overall square footage of a five lot subdivision.

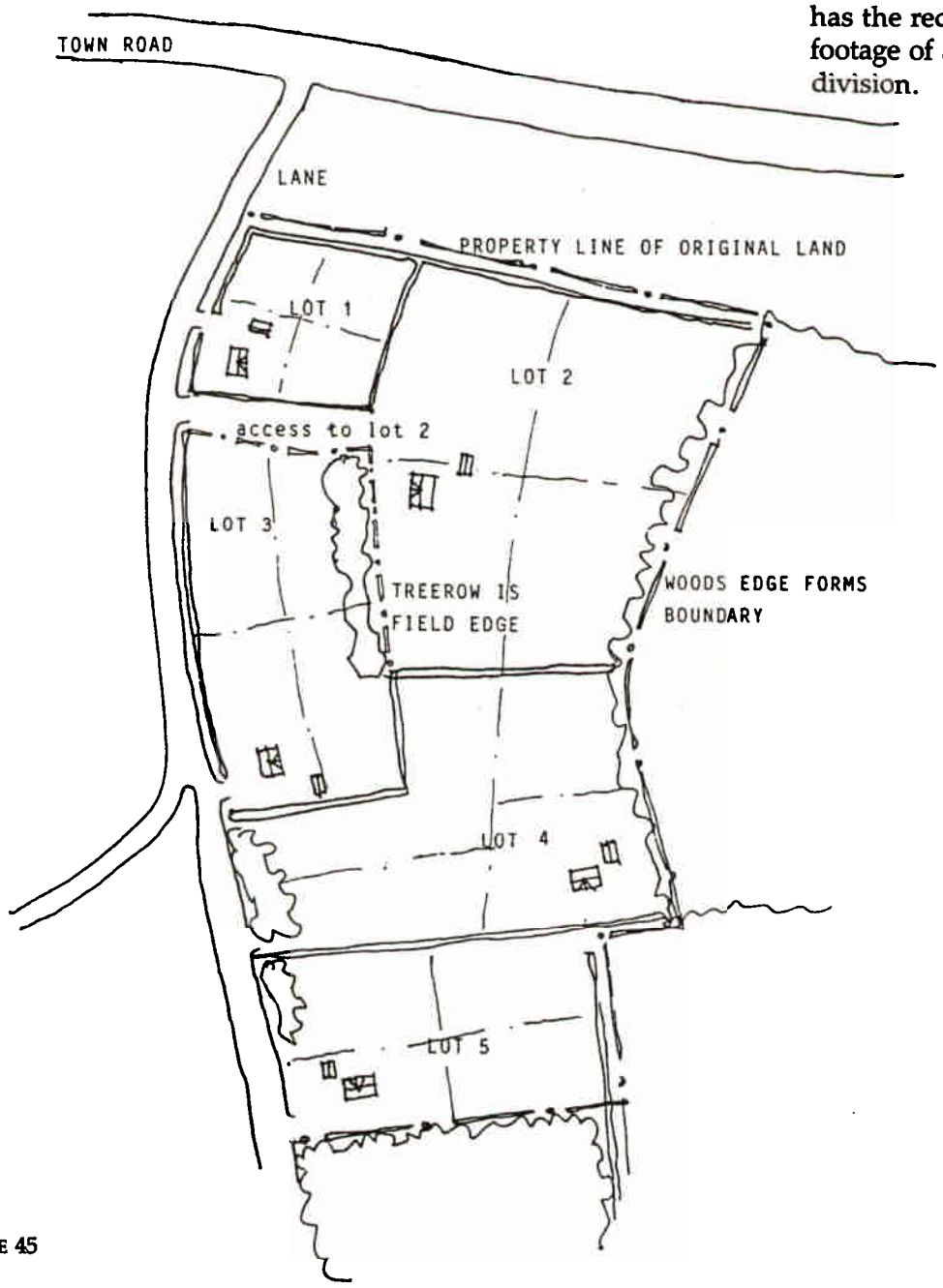


FIGURE 45

Parking

Writing parking ordinances is often a difficult exercise, especially in a rural, historic situation. In commercial growth areas, parking is traditionally placed in the front setback area and is a powerful visual element of strip development. Loheed suggests that creativity in planning for parking should be encouraged in every possible way and offers the following techniques to prevent it from dominating the streetscape:

- Limit front yard coverage by drives and parking to 50% or less.
- Require a special permit for any paved area exceeding 60' in width.
- Establish a town Street Tree Program and require trees to be planted along all streets; or require a natural buffer of trees to be retained.
- Establish a maximum curb cut dimension, and enforce it, even on existing uses. (Note: The speed of the adjacent roadway is affected by curb cut dimensions.)
- Encourage or require parking in rear yard areas. (Consider alternatives to impervious paving materials in total or in part.)
- Establish minimum lot sizes for commercial or other parking intensive uses that allow generous landscape to be retained.
- Prohibit access drives to parking from any right-of-way having a design speed in excess of 35 mph. (Consider limiting the number and type of access points if state highway rules control in the short term.)
- Where appropriate to the image of the street, require buildings to be built at the street line (or prevailing setback dimension), forcing parking to side or rear yard locations.

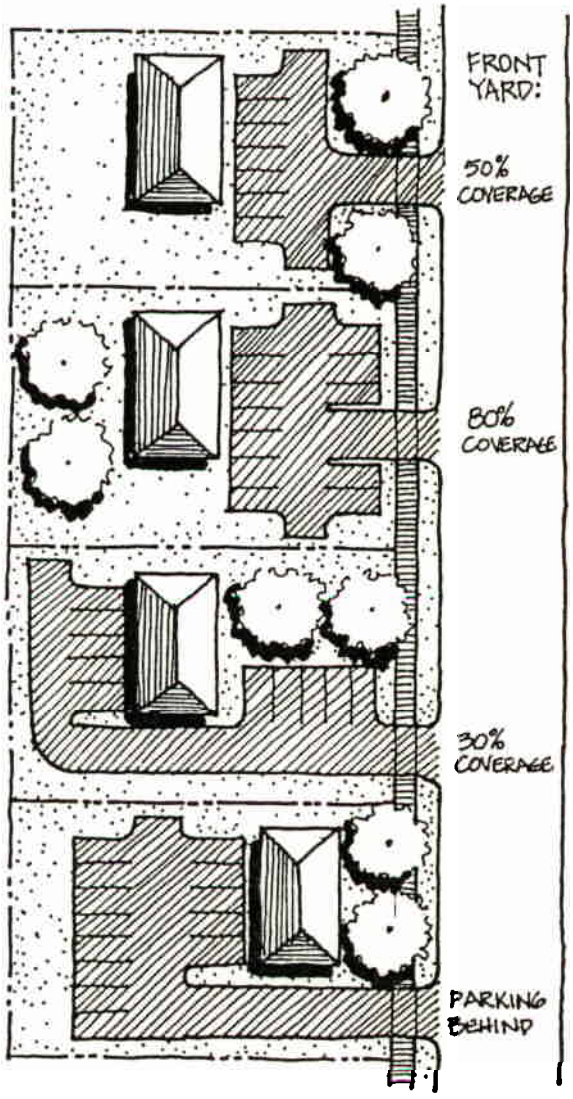


FIGURE 46

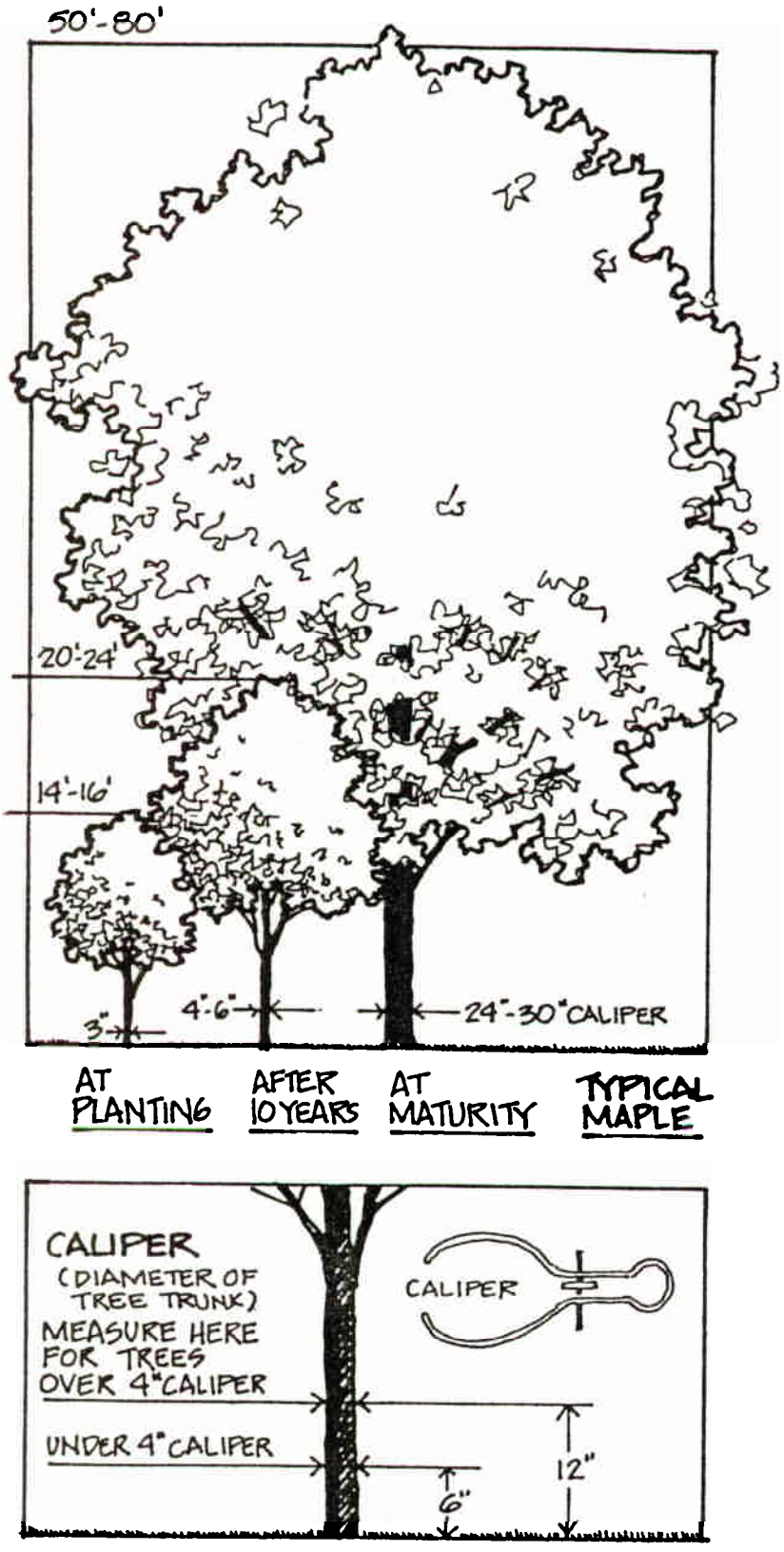


FIGURE 47

Vegetation

Nancy Barba suggests that an effective tool for mandating land use ordinances that preserve the character and growth patterns in your town is to specify the dimensions for vegetation. Zoning ordinances always regulate buildings and lot sizes and often regulate the fences that complement them. But, land use ordinances rarely mention specific vegetative landscape standards. You may want to consider including a section for landscape when drafting your land use ordinances because of the dramatic effect vegetation and fencing have on the areas and buildings they surround.

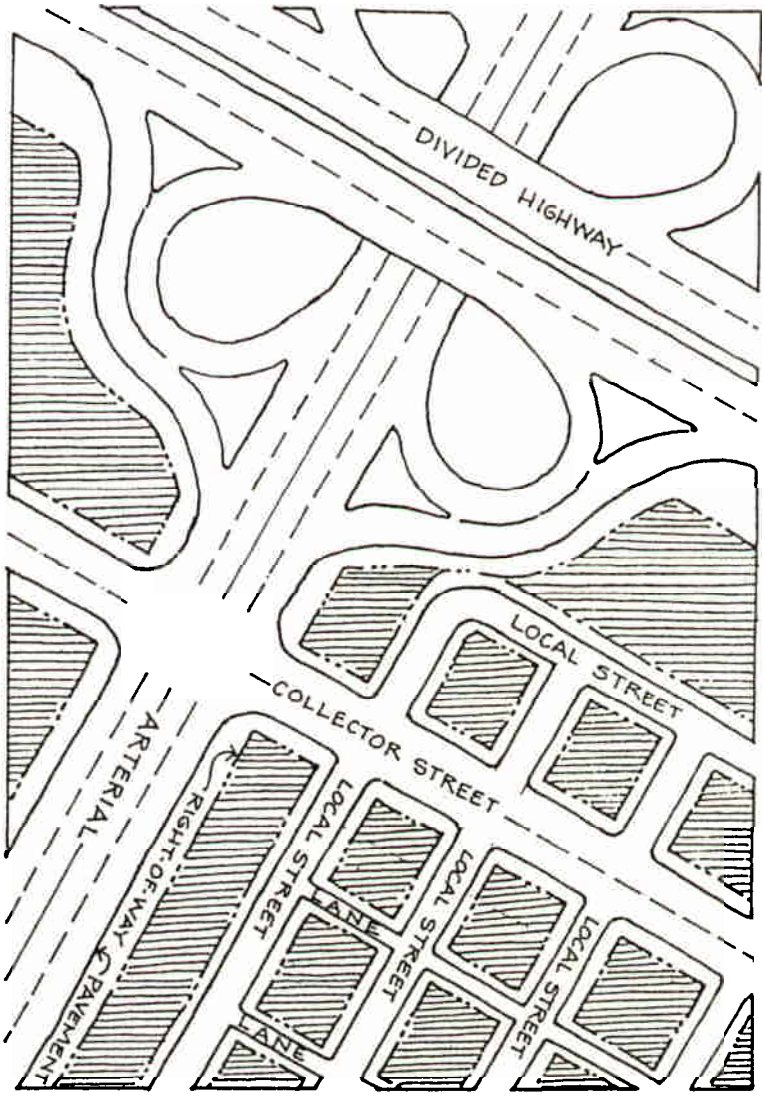
Road Patterns

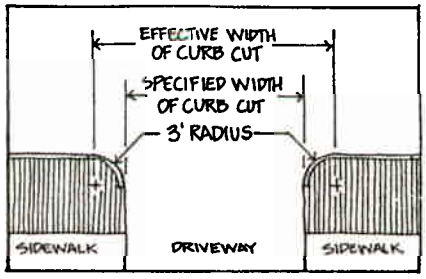
Understanding the road patterns in your town also helps you to distinguish between rural and growth areas before drafting your land use ordinances. Loheed suggests that since all significant uses are accessed by roadways, the town's image and the efficiency of the town in serving the needs of its citizens is controlled by the design of these roads. Loheed writes, "Most rural towns have a de-facto hierarchy of ways. Some of these will have evolved into high-speed roads (high-ways) in a gradual way, causing serious conflict with their function as access (streets) to uses along them.

No roadway with a design speed greater than 35 mph should be permitted the status of 'street,' due to the conflicting requirements of the process. Creation of a growth district, therefore, really means creating new streets or redeveloping the old one."

Understanding the design impact of streets includes knowing the measurement of the curb radii. A typical village street's curb radius may be only three feet. Some modern curb radius standards are as much as 25 feet or more. Even if the street width doesn't change, if the curb radii are increased, a traffic design feature to allow vehicles to move more quickly through a turn, the functional width of the street does change from a pedestrian's point of view.

Everett suggests that roads within subdivisions should not be to highway standards, but should meet the standards of local existing residential area roads. Lanes, rather than highways, can service a limited number of units in any planned open space, conservation, or farm retention development.





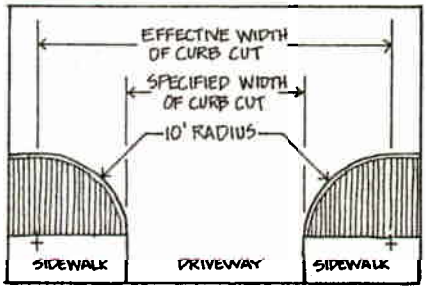


FIGURE 48

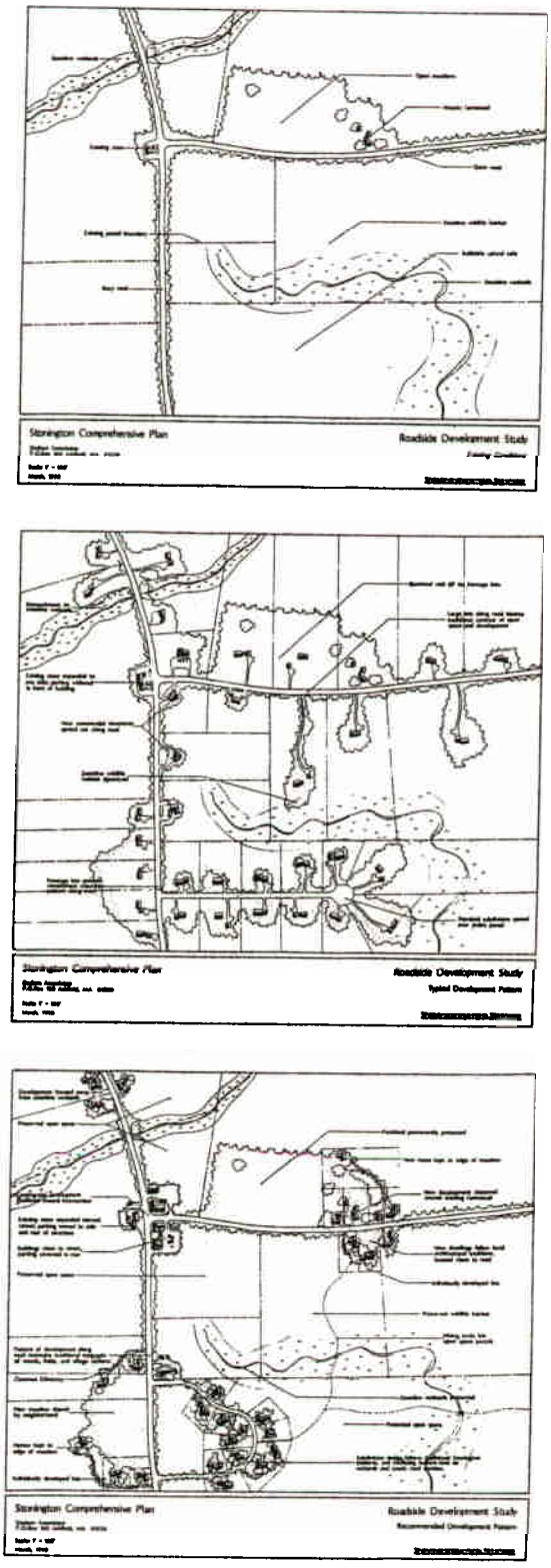


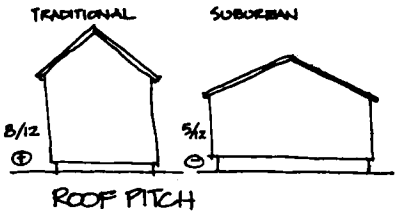
FIGURE 49

Illustrated triptychs may be used to understand existing and future road patterns. In a triptych, the first diagram, "existing," illustrates the community as it exists; the second diagram, "typical," reflects the typical regulated uniform development patterns that create visual sprawl; and the third diagram, "recommended," provides a creative and historically acceptable diverse scattered pattern. The triptych of Stonington, Maine, has been provided by Arendt/ Dodson. The paper plan for the laying of streets, zoning of civic, commercial, and residential places shown in this triptych envisions an important evolution from the "preserve and protect" approach that has characterized land use innovations in recent years to planning for growth in locally acceptable patterns.

Performance Standards

Once you are able to define the dimensions for your land use ordinances and feel comfortable with the way your numbers will "look" in your town, you should then define the performance standards within those boundaries. As a starting point, Everett suggests avoiding mid-field sitings, requiring traditional building materials, and adhering to the height and roof slope of the prevailing structures.

Regardless of what you choose for your specific performance standards, visual tools will help you to see how performance standards such as slope numbers and building heights will look in your town. As with other regulations, once you have learned how to assess the visual impact of performance standards, you can alter and modify them even from area to area so they accurately reflect the needs and desires of your community.



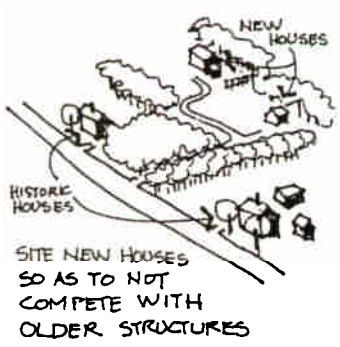
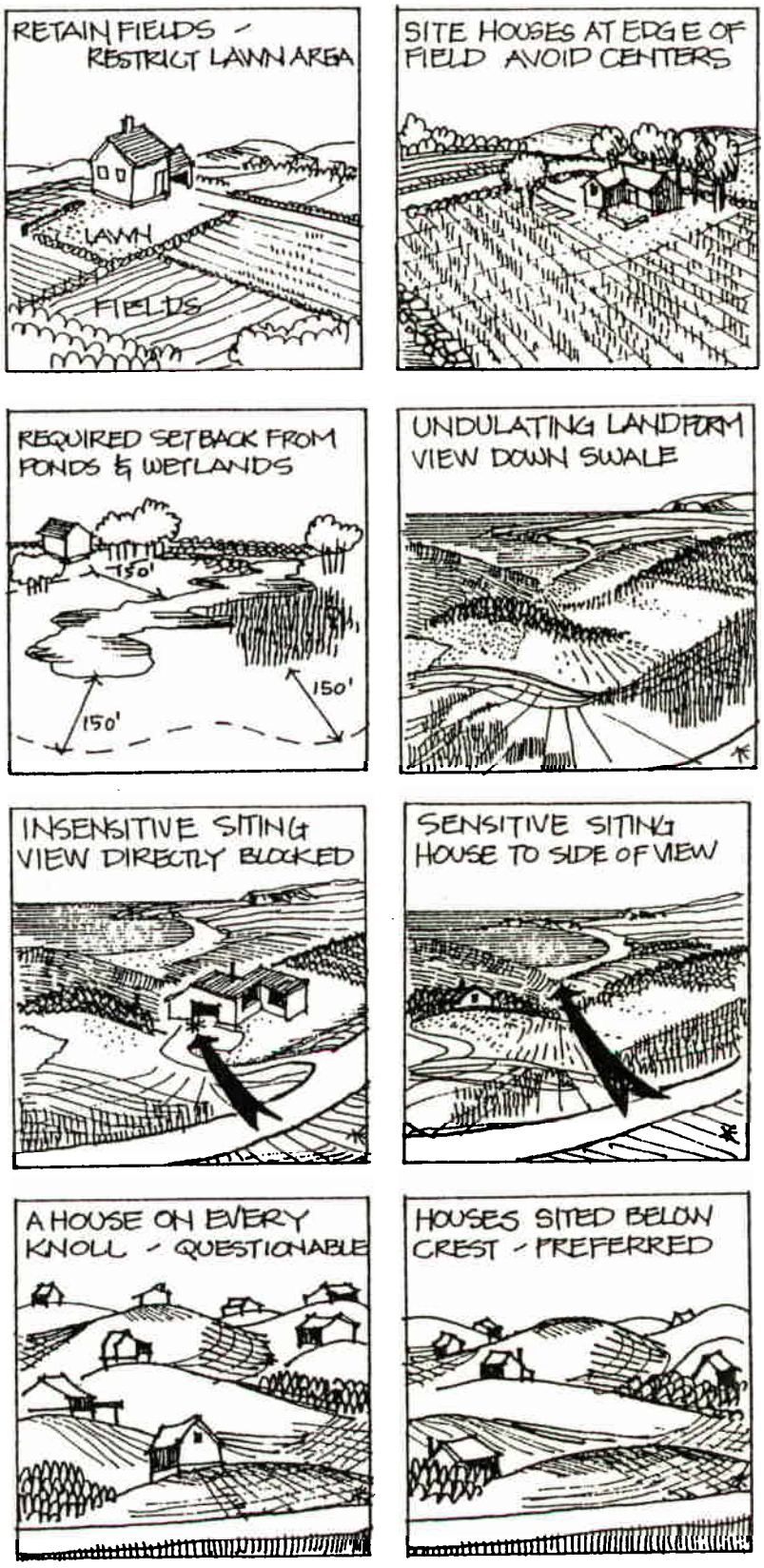
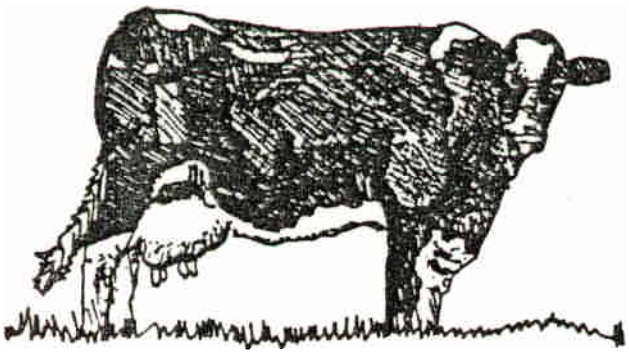
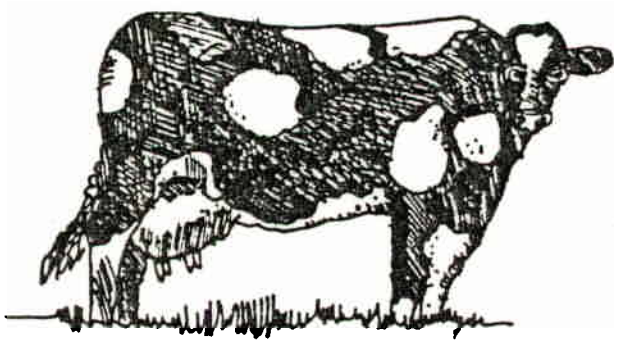


FIGURE 50

SITING SUGGESTIONS







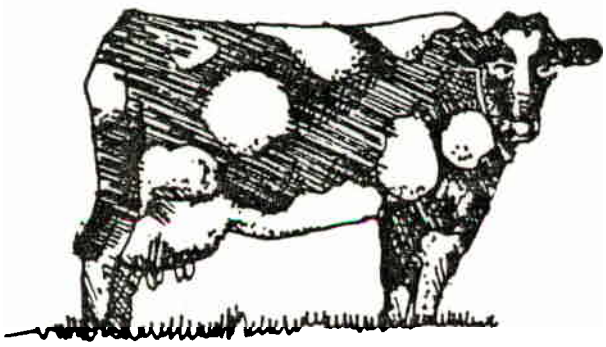


FIGURE 51

Pattern Recognition Zoning

Everett, who believes all land use regulations should be preceded by a planning board explanation of the intent of their action in relation to the image of their town, offers a general concept of pattern recognition zoning as one approach.

This approach to planning begins with the concept that each study area (town) is made up of a mosaic of uses and relationships of buildings to the land which constitutes the town's land use and visual profile. Some towns have more distinctive images, or clearer patterns of use, than others. Furthermore, each town has several subordinate patterns of use and visual identity.

This approach calls for the identification of existing patterns throughout a town which then serve as the basis for what development is permitted. In rural areas the alternation of farms, woods and houses is analyzed as a pattern to which new housing has to conform. In areas where newer uses have already disturbed older patterns or where no pattern is discernible the town then sets goals for how that area should be developed (creating, in effect, a new pattern for growth).

This process provides a philosophic approach which suggests that each town must tailor its planning concepts and regulations to fit the profile of its specific place.

The Town Of Wendell

Walter Cudnohufsky's approach to assessing the town character of a small New England village and determining its most appropriate rural and growth areas incorporates many of the ideas presented in this chapter. Cudnohufsky surveyed residents of the town of Wendell, MA to identify those aspects of the town – physical characteristics, specific places, activities, feelings, threats, and opportunities – which the citizens identified as inherent to the community. Cudnohufsky distributed surveys and accompanying maps to residents and then presented a preliminary summary of his analysis to the town at a Vision Workshop.

The survey, called "Places in the Heart" asked residents to do map exercises to determine the areas in the town most important to the residents. The first exercise asked them to identify places in the town that are special to them and describe them in a word or two.

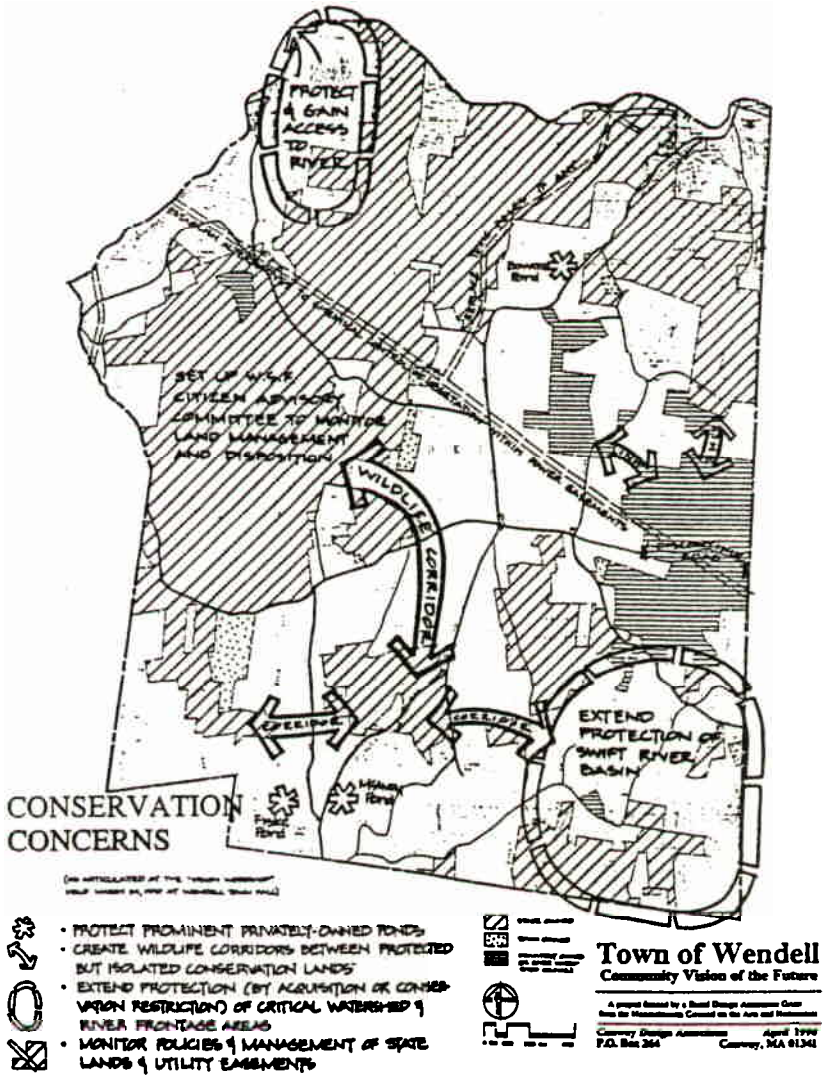


FIGURE 52

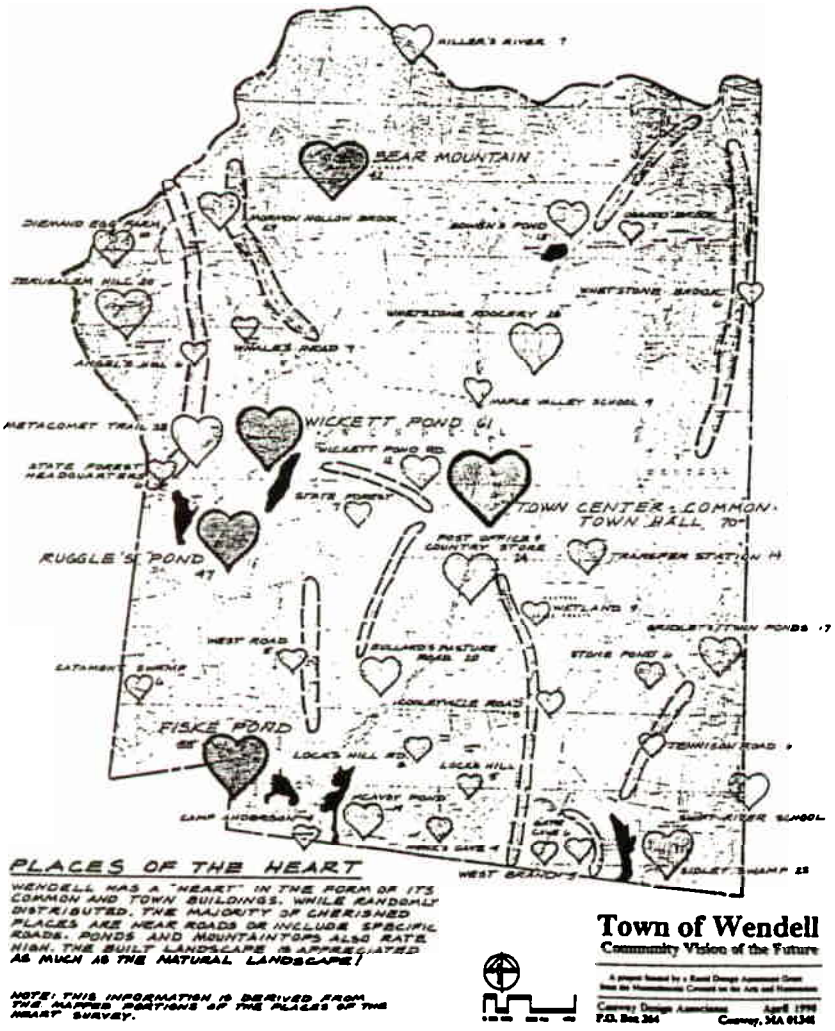


FIGURE 53

The second map required citizens to circle areas that have specific character or "feel" to them, and label them with a descriptive name that captures the feel of that area.

The following paragraphs are taken from Cudnohufsky's *Creating a Community Vision.* This assessment of the town of Wendell is the written result of the "Places in the Heart" survey. Through this one survey, Cudnohufsky gleaned information concerning rural and growth areas, road patterns, and rural character.

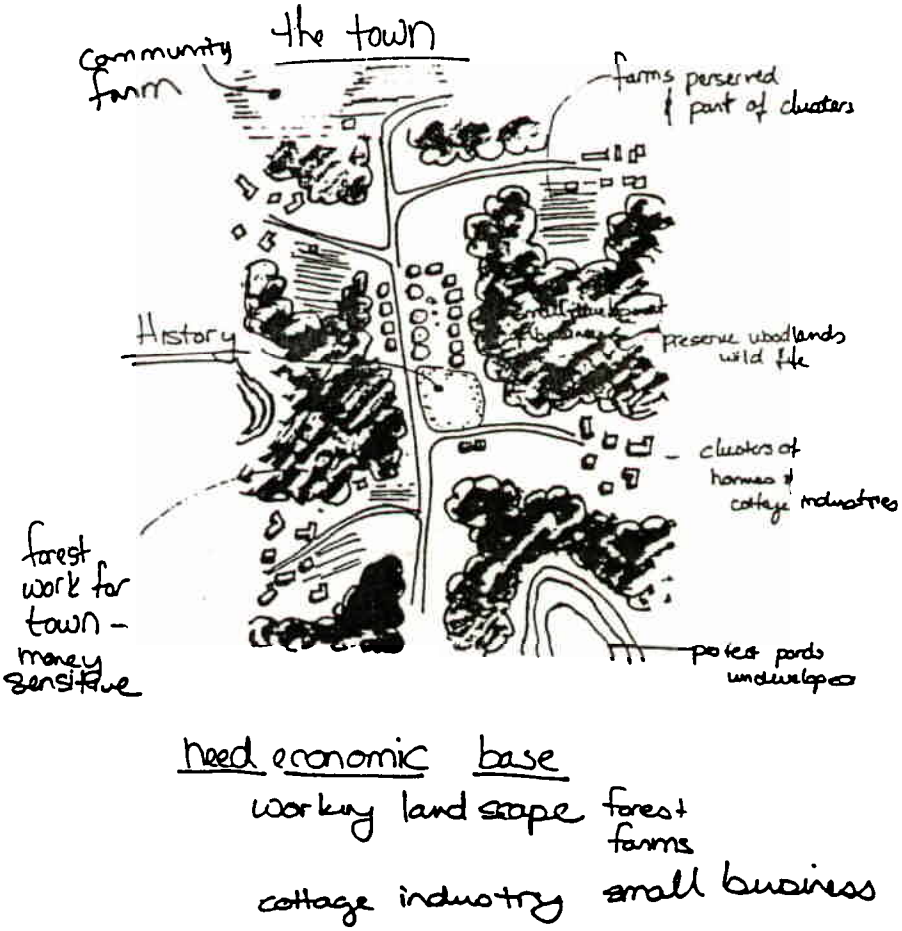
"Some of Wendell's physical aspects are shared with other New England rural communities. Forestry and agriculture are primary components of such town landscapes; they are not forced to compete visually or actually with suburban standards of residential development. There is ample open space of woods, fields and water. Many roads are unpaved, and traffic is minimal. People move to or remain in rural areas because of these physical features.

"A summary of citizen views, collected in the 'Places in the Heart' survey . . . divides Wendell into three distinct character zones. Of these three, the town center (defined by the proposed historic district) is the most memorable to Wendell residents. Second is the Wendell State Forest, alternatively described as recreational woods, deep woods, green buffer, wilder-

ness, and undisturbed open space. The balance of the community falls within residential districts; these historic villages or neighborhoods are less distinct in their boundaries, but prominent in the daily lives of Wendell residents.

"Many of the detailed attributes which Wendell residents most appreciate provide a rich and intricate tapestry. Roads and power lines cut through a densely wooded landscape and predominate with their linear movement; this system is regularly counterbalanced by visual landings, features that regularly catch and hold your attention, such as open farm fields, ponds, the common, cemeteries, etc. This balance of movement and landing is a necessary rhythm in a rural landscape."

The Vision Workshop comprised the second major component of citizen participation in this project. The purpose of the workshop was to actively involve town residents and artists in describing – both in words and in sketches – their hopes and visions for the future. With the help of visual aids – many just hand sketches – the town was able to envision the areas of future growth in Wendell as well as voice opinions concerning specific areas of the town such as the town commons. *Appendix B* is the agenda from the Vision Workshop held in Wendell, Massachusetts.



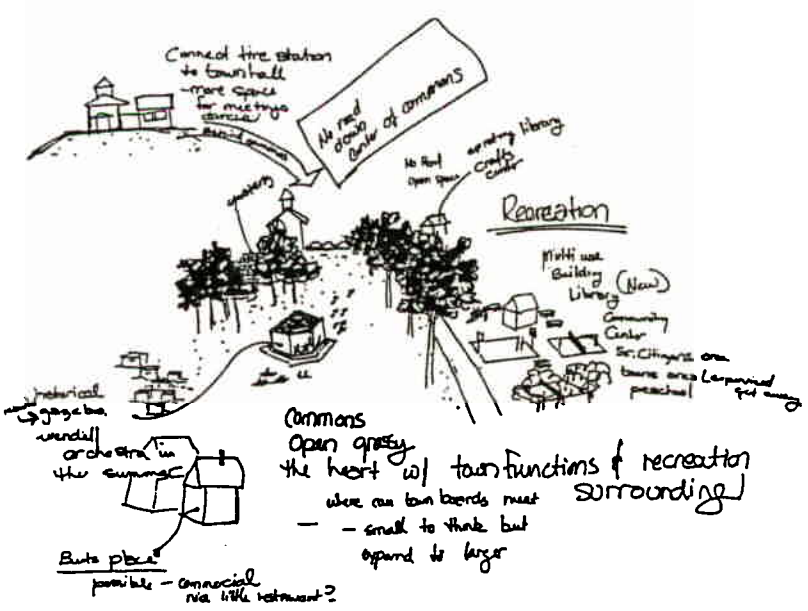


FIGURE 54

ENVISIONING THE FUTURE

Summary

Two years ago, one western Maine town used an unconventional tool in revamping its Main Street – the town fire truck. In order to help the road crew set the granite curbing around the town's memorial statue in the central intersection, the fire truck was driven around the intersection to verify that its turning radius could be accommodated. As a result, the formerly circular island was changed into an oval one – a shape the town will have to live with for many years to come. It turns out that this is standard policy when road width questions need answering.

A community's choices in type and size of road and safety equipment become a hidden design decision. Those choices can affect road widths and other visual elements that contribute to a community's unique spatial character.

Clearly, a town needs to accommodate its firefighting and snowplowing equipment.

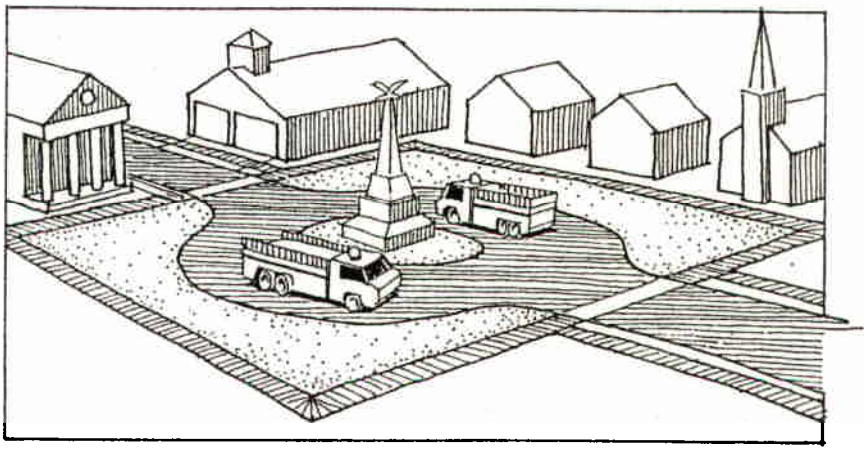


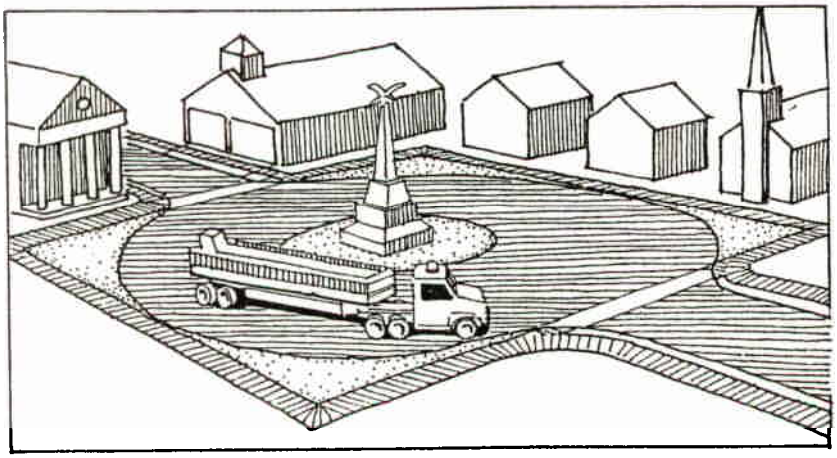
FIGURE 55

But there are better ways to design a community. Land use regulation does not have to be a hit-or-miss proposition. Design issues can be anticipated and addressed if people making land use decisions choose to visualize what their regulations specify.

Visualizing dimensions is an acquired skill. You can become more fluent by learning to perceive distance, area, and height. Your skills will improve as you become more familiar with and use the same design tools used by designers to present their proposals.

As you apply these visualization skills, you will be able to predict how your proposed land use ordinances will affect the look of your town. You will have a sense of how to develop dimensional requirements best for your town.

The goal is that in wrestling with conservation, affordable housing, and economic development, your town can prepare for growth that enhances its character.



HOW TO BUILD A TOWN MODEL

VERMONT VISUAL LABORATORY PROJECT

Summary of Simulation Procedures

© Thomas D. Visser
Historic Preservation Program, Department of History,
University of Vermont, Burlington, VT 05405

Recent research by the University of Vermont's Historic Preservation Program has explored how three-dimensional scale models can be used to simulate various types of physical changes to neighborhoods. Through the use of "Visual Laboratory" simulations, the impact of the loss of historic buildings or the construction of proposed developments can be readily visualized and options can be explored. This ability to preview the future could assist those reviewing the impact or zoning of proposed projects on existing neighborhoods.

Recognizing that many people have difficulties translating plot plans and elevations into clear images of the impact of proposed projects, such visualization techniques as artists' renderings have traditionally been used. These however can often emphasize the glamour of the proposal through clever manipulations of viewpoints and scenery, while the true impact on the character of the existing area may be difficult to ascertain.

Models of proposed buildings can effectively translate plans and elevations into three dimensions, but all too often project models are constructed solely of the new building, and the relationship with the pre-existing context of the area affected by the proposal is excluded or only minimally rendered. Whether viewed directly or photographed, three-dimensional simulations can be highly realistic, but the cost of producing scale models of streetscapes, waterfronts, and villages can stand as a limitation. Modelmaking is very labor intensive. Firms specialize in this work, producing models and images for architects and developers, and it is not unusual for a high-quality simulated view of a proposed building, produced from a detailed model, photographically superimposed into an existing landscape, to cost several thousand dollars. For multiple views on a forty-acre neighborhood, the cost could be many times that amount.

A main goal of the research which Professors Chester Liebs and Thomas Visser have been conducting at the UVM Historic Preservation Program's Visual Laboratory is to develop affordable techniques for producing accurate, objective environmental simulations of neighborhoods, especially to help planners, review commissions, citizens, and designers assess the impact of changes. Largely funded by a Design Arts grant from the National Endowment for the Arts, the project has also received support from the Town of Williston, Vermont, and the Williston Historical Society.

Work on developing environmental simulation techniques to assist preservation planning has been proceeding for over a decade at the University of Vermont. A class of UVM Historic Preservation Program graduate students examined the potential of such simulations in the 1970's. A leading center of this work for urban planning application is the Berkeley Environmental Simulation Laboratory at the University of California, Berkeley, under the direction of professors Peter Bosselman, Karl Mellander, and the late Donald Appleyard. We are indebted to Peter Bosselman and his graduate students, Richard Sinkoff and Kevin Gilson, for their assistance on this project. Mr. Sinkoff served as an intern during the summer of 1987. The simulation techniques were further refined by Liebs and Visser and a class of Historic Preservation Program graduate students of UVM.

The purpose of this article is to review this latest research and techniques so that others may take advantage of this potentially powerful tool and further explore its applications, especially for the preservation of historic neighborhoods.

First it must be recognized that these modeling techniques are attempting to produce an illusion of reality. The very process of creating such illusions offers insights into how actual landscapes are composed and perceived, and what visual clues trigger the recognition of the specific or general qualities of a place. That is, we have been attempting to identify those elements of landscape which give it its character. Our models have included the following elements:

1. Buildings
2. Trees
3. Contoured earth (and water) base
4. Ground covering
5. Roads
6. Automobiles and trucks
7. Utility poles and signs
8. People
9. Sky backdrop
10. Horizon backdrop
11. Time-of-day lighting

These are the variables, the visual clues which we have orchestrated to depict "Vermont" landscapes. One goal of our research is to show how these elements can be manipulated to produce life-like landscape simulations. It must be recognized though, that the techniques used to produce these illusions of reality could also be used to cast a biased light. Care must also be taken not to let the ease of alteration of landscapes encourage change. It is hoped that the process of simulating the impact of landscape changes through the manipulation of these simulations as test models will provide the opportunity to encourage debate and analysis of various planning and preservation options.

Types of Environmental Simulation Models

Simulation models are frequently produced for either direct viewing or photographic images.

Direct viewing models hold a high potential for preservation planning and public involvement. Many city planners use such models to evaluate the impact which proposed buildings may have on views of the skyline or within the city and to test how setbacks will affect the amount of sunlight on streets and in parks and to predict wind conditions. Environmental simulation models may also be used by planners and review boards to test conformance with existing zoning and historic district ordinances, as well as to help develop or refine such ordinances. To insure fairness, such models should be accurate and objective with specified tolerances and conventions.

As an educational tool, models can offer insights into basic planning concepts. For example, densities, lot-coverage ratios, setbacks, types of use and massing may be illustrated within identifiable settings and the effects of altering these legal parameters may be perceived from a pedestrian's viewpoint. Modeled areas may also be used as analogues to illustrate the types of change which may occur in other areas as well.

Images produced from studio models of landscapes may offer powerful, publishable means of previewing options for the future. While the Berkeley Environmental Simulation Laboratory and others have produced impressive results on film and video using sophisticated optical equipment and "special effects" filming techniques, our work at the University of Vermont has explored methods to produce effective print and slide images with basic 35mm camera equipment. These techniques are discussed later. Many creative shortcuts and effects may be utilized to produce images in a studio which could not be used for models which would be viewed directly. The highly-detailed studio models are however, inevitably fragile and vulnerable.

Key Sites and Impacts

When planning a project and evaluating a potential site to model, several questions should be asked. Where is change likely to occur? A specific project might be planned for a specific site, but what will be its impact on the surrounding area? What about indirect impacts? How can these impacts be shown?

History

When the objective is to plan and review proposed changes to an existing landscape, a thorough understanding should be gained of the history and evolution of the site. Historical research, especially based on pictorial evidence and old maps, is a critical component of all landscape preservation projects. When one walks a site with an awareness of its changes and evolution, the visual clues that create a sense of place and tell of its history may be more apparent. These visual clues should be noted and photographed for future reference.

Viewpoints

When visiting a prospective site it is important to analyze how the landscape is actually perceived. Draw a sketch map of the site and walk (or drive) along the frequently traveled routes to all important destinations. Make note of the locations where vistas unfold. What is the background view? Record each of these vistas from a typical viewer's perspective with a panoramic series of photographs. Record the sequences of views one experiences when moving through the site. By analyzing these views, it may become apparent that some viewpoints are especially memorable and are most identifiable by the public. (Watch how people view the site. Exactly where and at what do they frequently look?) Note the locations of these popular viewpoints. The site may also have important vantage points which may not be accessible or are infrequently visited. These should also be recorded with panoramas. Are changes planned which may create new popular viewpoints? How does one's perception of the site change by time of day? day of week? season? type of weather?

Area to be Modeled

What are the issues to be addressed by the simulation project? Which specific sites are under review or analysis? What are the changes or threats? How will these be physically manifested? From which popular viewpoints will these issues be reflected? How will they be depicted in the model? What model views will illustrate the issue? Is the model to be used strictly to produce simulated images or will it be used for direct viewing? Does the site have a natural concavity or structures which could define the model's bounds? (Most sites will require separate backdrops extending to the horizon for each model view.) How many (or few) viewpoints (and backdrops) are necessary? How much detail should be depicted in the backdrops?

Scale

The following factors may influence the choice of the scale of model: Large scales offer the potential for more realism of details, while smaller scales allow broader spaces to be modeled. Modeling supplies are available in architectural scales (from 1/2 to 1/32 inch to the foot), engineering scales (1/20 to 1/100 inch to the foot), and in model railroad scales (HO is 1:87, N is 1:160, and Z is 1:240.) If a simulation is to address such issues as alterations to building facades and streetscape changes, a scale of 1/16 inch to the foot (1:196) offers sufficient detail, while allowing a room-sized model (six by nine feet) to represent slightly less than 50 acres. For modeling larger landscapes, a scale on the order of 1/50" to the foot would be necessary, however the amount of detail and realism from a simulated pedestrian's viewpoint would be limited. Indeed many people viewing 1/50 scale models feel as though they are viewing the site from an airplane, while at 1/16 scale, the pedestrian viewpoint is readily imaginable. Models built in scales smaller than 1/16" are also more difficult to photograph with 35mm cameras and standard macro lenses.

Comparison of Scales

scale	ratio	model area per square acre	model building height per 10 foot story
1″/16′	1:192	13″ x 13″	0.625″
1″/32′	1:384	6.5″ x 6.5″	0.313″
1″/50′	1:600	4.2″ x 4.2″	0.20″

Site Documentation and Mapping

The accuracy and potential for realism in a model depends on the accuracy, quality, and quantity of information available about a site. Sources of geographic information for urban areas include municipal tax maps, aerial photos, and land surveys. In rural areas, U.S.G.S. quadrangle maps may be the only information available. While quadrangle maps can be used to develop a base map, the margin of error in evaluations will be dictated by the 20-foot contour interval information. Hopefully computer-based geographic information services (GIS) information could contribute as well.

While the general shape of the land may be modeled, additional information must be obtained to depict such features as roads and ditches. Ideally the entire site would be surveyed by tape and transit to gather information on elevations, locations of streets, buildings, trees, signs, utility poles, types of ground cover, et cetera, but for most projects, the cost of such a survey would be prohibitively expensive. An alternative is to use sequential panorama photographs.

Sequential Panorama Mapping

This technique was developed to utilize information gathered from sequential photographs taken on site from a pedestrian's point of view. By using triangulation it is possible to map the locations of many site features. The effective accuracy is about plus-or-minus two feet within 100 feet of a fixed point. While this would be too great a margin of error for a land surveyor, it usually satisfies the tolerance requirements for these environmental simulation models. Since the procedure does not require the location of each feature to be measured on site, as a tape and compass survey would, the time required to produce a base map is dramatically reduced. Limited tape and compass information, however, can be very useful to establish base points and to check tolerances when laying out the base map.

The following equipment is required for this sequential panorama mapping technique:

- 35mm camera with a wide-angle lens (preferably 28mm)
- tripod
- 100 foot tape
- sight level
- chalk or marking pins

Stations are marked along a straight baseline (the edge of a road or sidewalk, for example) at measured intervals. (Where a site lacks appropriate straight lines, a row of stations might be flagged or marked by traffic cones. The baselines should be visible in the photographs.) These intervals should be determined by the distance features are located away from the baseline. For a rural village or suburban site, 100-foot intervals may work well, but this should be shortened in tighter urban situations where stations might also be located at key positions, such as street intersections. Complex sites would require several baselines, typically along each street.

At each station a 360-degree panorama is photographed. The camera should be aimed level and rotated on a horizontal plane to avoid parallax distortion. At least five images are required when using a 28mm lens, as each frame will cover about 75 degrees. (At least six images are required with a 35mm lens.) Color slides or enlarged prints or black-and-white contacts may be used, however since enlarged prints are usually cropped at the sides when commercially printed, an extra overlap should be allowed when shooting print film panoramas. This need not be excessive since many 35mm cameras photograph an image slightly larger than that seen through the viewfinder.

Base Map

A full-scale base map should be produced for the model with contour lines and the locations of all the significant surface features. Maps, surveys, and aerial orthophoto maps ("tax maps") may be economically enlarged to the proper scale by using an overhead projector, tracing the image onto large sheets of paper. As each source of mapping information will have different degrees of accuracy and resolution, the intermediate maps should be recorded on separate layers of tracing paper. Discrepancies can then be resolved before producing the final base map.

The information from the sequential panoramas may be plotted on a map in the following manner:

The stations are first plotted along a straight line. The locations of landscape features are then scaled off the images with a guide calibrated by degrees. The angle between each object to be mapped and the baseline is plotted. (As mentioned above, the full width of the film image will be about 75 degrees for a 28mm lens.) When the same procedure is followed from another station, the location of the object is the point of intersection of the angles.

Model Construction

The following techniques produce models suitable for studio photography and limited public display using materials which are readily available at most building supply yards. More durable materials would be required for models which would receive continuous public use.

Bases

Bases should be strong, lightweight and resist warping. Flush hollow-core wooden doors satisfy these requirements and their size (typically 3 feet by 6 foot 8 inches) allows for easy transportation and storage. Smaller sections based on a grid system might also be used, perhaps with painted plywood as a base.

The land contours may be sculpted from polyurethane or polystyrene foam. "Bead-board" and most building insulation foams, however, are difficult to work as they tend to tear rather than carve. The contours of the land may be transferred to the foam with a depth gauge, then the excess material may be carefully carved away with wood-working tools. The carving and sanding should be completed to within a vertical and horizontal tolerance of about 1/8 inch. The surface may then be plastered. We have found that a thin mixture of Plaster of Paris rapidly applied with a large paint brush can produce a smooth, eggshell-like, protective layer. After sanding and priming, ground foam model railroading flocking can effectively simulate surface vegetation, while paved areas may be painted.

Trees

For many sites, trees are a significant part of the landscape. Accurate models will require trees which match the location, height, shape, color and species of those on site. Extra fine steel wool stretched over armatures fashioned from twigs from such shrubs as Japanese Spirea, may be spray-painted and dusted with ground foam to produce life-like trees.

Buildings

Realistic buildings may be constructed from scale-rectified colored photographs. By photographing building facades with a wide-angle, perspective-control lens from a predetermined fixed distance, scale-rectified prints may be quickly and economically obtained. For most sites, acceptable photos can be obtained with a 35mm camera with a 28mm perspective control lens, mounted on a tripod. The proper distance to the building facade should be measured with a tape measure, and a sight level helps align the camera view. The perspective control lens can then be shifted to take in the upper parts of the building. Test shots should be taken to determine the proper distance, compensating for the enlargement ratio of the processor's equipment. (For standard 3" by 5" color prints made by a local "quick-print" processor, we found that for a 28mm lens, 72'3" was the required distance for 1/16th scale, while 90'3" was required for a 35mm wide-angle lens.) The facade images are cut from the color photographs and mounted on illustration board. Marking pens and sculpting clay work well for modifications, "touching up" glue joints and edges and for odd-shaped details.

Backdrops

For studio simulations, a large theatrical flat of muslin stretched over a wooden frame, painted as a sky with clouds provides the basic backdrop. Most simulations will also require custom background paintings which extend to the horizon for each viewpoint. These may be painted onto paper or illustration board to include a skyline with distant hills, treelines and buildings. The horizon backdrops are a very important element to establish an identifiable sense of place in a simulation.

Photography and Lighting

Studio lighting must be compatible with the film type to produce realistic colors. (Use a tungsten-rated color film for incandescent lighting or appropriate filters). A primary light source should act as a "sun" to cast shadows appropriate for the location and time of day. Secondary lighting should be diffused, yet evenly distributed. For a simple scene, at least five 500 or 750 watt photofloods may be required. To photograph models using 35mm cameras, a macro lens is generally required. This will allow a sufficient depth-of-field for many views when set to the minimum aperture (typically f-16 or f-22). With shutter speeds of at least several seconds, a tripod is also required. Ideally the model will be constructed in sections to allow the camera to be positioned at the edge of a base section for key views.

Testing "What-if" Scenarios

Constructing the existing conditions model is the first step, however one of the main purposes of the Visual Laboratory is to test proposals and "what-if" scenarios. These alternatives must also be translated into three-dimensional forms. Architectural evaluation drawings may be reduced to the proper scale on a photocopier, then pasted onto illustration board, and colored with marking pens. Generic building types may be produced from photographs of buildings located elsewhere or by computer. Scale automobiles, trucks, and human figures are available from architectural suppliers. These could also be photographed and cutout as silhouettes. Signs and utility poles add an important degree of realism and depth. Roads and parking lots may be laid down with construction paper or painted illustration board.

Costs and Time Estimates

The major portion of the materials cost to produce a visual laboratory model is for photography expenses. Site documentation for a simple site may require 10 to 20 rolls of print film and 5 to 10 rolls of slide film. For the scale-rectified photographs used for the building facades, each building may average about a half roll of print film. Duplicate "generic" buildings may be constructed from multiple reprints. The base and backdrop materials, including foam, plaster, paint, clay, flocking, model autos, muslin, et cetera, may cost between several hundred and several thousand dollars for each model. The basic photographic equipment including a 35mm SLR camera, 28mm perspective-control lens, 50mm macro lens, tripod, and studio lights could cost several thousand dollars.

Based on our experience with the several test cases, the following list summarizes the time necessary to develop a visual laboratory for a site, assuming a team of two persons:

1. Preliminary site evaluation and program development: Variable, several hours to several days.
2. Site mapping and panorama photography: 1 to 3 days.
3. Base map: 1 day or more, depending on how well the site has been mapped or surveyed.
4. Base construction: 1 week (topographically complex 6'8" x 9' model).
5. Scale rectified photography of buildings: 30 minutes to 4 hours each building, depending on site and complexity of the structure and the number of facade planes.
6. Building construction: 1 hour to 1 day per building, depending on the complexity and scale.
7. Trees: 2 to 3 days for 100 of various sizes, shapes and species.
8. Miscellaneous landscaping features (signs, utility poles, cars, people): 1 to 3 days.
9. Landscaping the model (roads, turf, trees, buildings): 2 to 5 more days, depending on complexity and scale.
10. Alternative structures and features: variable, several hours to several days.
11. Backdrops (construction, priming and painting): 1 day for each.
12. Studio photography (including setup of model and lighting): 1 to 2 or more hours per image.

AGENDA:
VISION WORKSHOP FOR THE TOWN
WENDELL, MASSACHUSETTS
Saturday, March 24, 1990
9:00 am - 3:00 pm

PURPOSE:
To articulate visually and in words several alternative visions for the future of Wendell, and to arrive at some consensus of the direction in which Wendell should go.

8:45 SIGN IN
Review mounted photos, add comments – music. *30 min.*

9:15 INTRODUCTIONS
To the project (Michael Idoine/Prudy Smith) *5 min.*
To the day (Walt Cudnohufsky, CDA) *5 min.*

9:30 SURVEY RESULTS & CONCLUSIONS
(Margo Culley/Walt Cudnohufsky) *15 min.*

9:45 CONCLUSIONS DRAWN FROM ANALYSIS MAPS/PHOTOGRAPHS
(Walt Cudnohufsky/Mollile Babize, CDA) *30 min.*

10:15 SKETCH GROUP I
Break into small groups with recorder & illustrator; describe visions for areas, specific locations, regions in town. Kids go outside for half hour to fantasize about activities they'd like to see on the common, return inside to draw individual for half hour. *60 min.*

11:15 REPORT TO FULL GROUP
Ideas generated within each group (kids go first then adults – only spend a few minutes per picture) *45 min.*

12:00 LUNCH *30 min.*
(Music, informal discussion, add comments to photos on walls)
RAFFLE DRAWING
(Participation of kids ends at this point) *15 min.*

12.45 SKETCH GROUP II
New groups continue the exercise *60 min.*

1:45 WHOLE GROUP DISCUSSION/BRAINSTORMING
Of ideas & issues raised, of the future of the town, of fears & hopes, & any consensus which emerges. (Walt moderates) *60 min.*

2:45 SUMMARY OF THE DAY
(representatives from town and CDA) *15 min.*
Wishes, regrets, conclusions

3:00 ADJOURNMENT

Guidebooks

Hendler, Bruce. *Building in the Wildlands of Maine.* Augusta: Maine Land Use Regulation Commission (LURC), 1973.

Holleran, Everett, Benedict. *Building at the Shore.* Providence: RI Department of Environmental Management, 1984.

Mackin, Anne and Alex Kriger. *A Design Primer for Cities and Towns.* Boston: Massachusetts Council on the Arts and Humanities, 1989.

Pioneer Valley (MA) Planning Commission. *Design Guidelines Handbook.* Granby, MA: Pioneer Valley Planning Commission, 1989.

Pioneer Valley (MA) Planning Commission. *Guidebook for Developing in Granby's Commercial District.* Granby, MA: Pioneer Valley Planning Commission, 1989.

Rhame et al. *Residential Streets.* Washington, D.C.: Urban Land Institute (ULI), 1974.

Stokes, Samuel et al. *Saving America's Countryside: A Guide to Rural Conservation.* Baltimore: The John Hopkins University Press, 1989.

Articles

Curtis, William J.R. "Towards An Authentic Regionalism." MIMAR 90. Jan '86.

Hiss, Tony. "Reflections (Regional Identity)." THE NEW YORKER MAGAZINE. Aug 21, '90 and Aug 28, '90.

Kay, Jane Holtz. "The Green vs. The Grid." LANDSCAPE ARCHITECTURE. Oct '89.

Knack, Ruth Eckdish. "Repent, Ye Sinners, Repent." PLANNING MAGAZINE. Aug '89.

Meinig, D.W. "Symbolic Landscapes." The Interpretation of Ordinary Landscapes. New York: Oxford University Press, 1979.

General Reading

Alexander, Christopher et al. *Pattern Language: Towns, Buildings, Construction.* New York: Oxford University Press, 1977.

Haar, Charles and Jerold Kayden, eds. *Zoning and the American Dream: Promises Still to Keep.* Chicago: Planners Press (APA) in association with the Lincoln Institute of Land Policy (Cambridge, MA), 1989.

Hall, Edward T. *The Hidden Dimension.* New York: Doubleday & Co., 1966.

Jackson, J.B. *The Necessity for Ruins and Other Topics.* Amherst, MA: University of Massachusetts Press, 1980.

Jellicoe, Geoffrey and Susan. *The Landscape of Man: Shaping the Environment from Prehistory to the Present Day.* New York: Van Norstrand Reinhold Co., 1975.

Krier, Leon. *Houses, Palaces, Cities.* New York: St. Martin's Press, 1984.

Lynch, Kevin. *Site Planning.* Cambridge, MA: The MIT Press, 1975.

Mitchell, William. *Photographic Falsehoods.* Cambridge, MA: The MIT Press, 1991.

Nelson, George. *How to See.* Boston: Little, Brown & Co., 1979.

Wright, Paul. *Highway Engineering* (5th edition). John Wiley & Co., 1987.

Video

Duany, Andres. "Traditional Town Planning." Lecture at the Boston Museum of Fine Arts, 1989. Order from James Kaufman & Associates, 5312 Camellia Ave., Sacramento, CA 95819. $15 plus $2.40 postage. Phone (916) 451-1542.

Other

Chapman, Donna and Tom Johnson. Project PREPARE: Maine. 1988-1990. Part I is a compendium of state and local growth management laws. Part II is a case study of Wiscasset and Fryeburg. Order from NE Regional Office, National Trust for Historic Preservation, 45 School Street, Boston, MA 02108. $20 plus postage. Phone (617) 727-2040.

Sobol, Judith, ed. New Architecture: Maine Traditions. Portland, ME: Joan Whitney Payson Gallery of Art at Westbrook College, 1983. Catalog of exhibition with photos and articles from project committee concerning "the ability of contemporary architecture in Maine to continue regional traditions."

Illustrations *(except as noted below)*
C. Michael Lewis, Portland, ME

Layout and Design
Amy Fischer, Camden, ME

Initial text organization and editing
New England Writers Group, Brunswick, ME

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Typeworks, Belfast, ME

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